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BLUE JAY

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COVERS: **Front** - Great Horned Owl approaching young with prey (*Peromyscus* sp.).
Photo by Wilbur Tripp
Back - Leaf Beetle (*Calligrapha verrucosa*) on willow.
Photo by Ronald R. Hooper

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BREEDING STATUS AND NOTES ON DIET OF THE NORTHERN SAW-WHET OWL AT DELTA MARSH, MANITOBA

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Northern Saw-whet Owls breed in forests throughout southern Canada, northern and western United States, and some mountainous areas of Mexico.[6] At Delta Marsh, Manitoba, saw-whet owls have been considered rare to uncommon from spring through fall.[8, 13] Recently, a mist-netting program run by the Delta Marsh Bird Observatory has shown them to be common fall migrants.[10] We present observations that confirm breeding of saw-whet owls at Delta Marsh and identify prey items taken from pellets collected at a single roost site.

Breeding Season Observations

Data from the Prairie Nest Records Scheme indicate that saw-whet owl nests are active in Manitoba from March through July. Although the timing of pair formation is poorly known,[6] breeding activity likely begins some time earlier than the first activity recorded at nests. Eight sightings of single adult saw-whet owls roosting have been recorded during or just prior to the breeding season at Delta Marsh: 22 February 1988 (K. A. Hobson), 27 April 1973 (E. E. Mowbray), 23 May 1999 (SGS), 24 or 25 May 2000 (SGS), 26 May 1992 (anonymous), 27 May 1985 (J. V. Briskie, K. A. Hobson, SGS), 5 June 1986 (J. V. Briskie), and 23 June 1982 (M. T. Sheridan). Some of these observations were made while TJU, SGS, and students conducted field research at the Delta Marsh Field Station (University of Manitoba) from 1974-2002. Others were obtained from a logbook of observations at the field station and through personal communications with birders who visited the study area. In addition, two saw-whet owls were heard calling on 10 April 1995 during part of Manitoba's Nocturnal Owl Survey (J. Duncan pers. comm.). Two saw-whet owl specimens in The Manitoba Museum were collected at Delta Marsh: a female from 2 January 1971 (MM 2992) was possibly wintering and one of unknown sex found dead sometime in March 1949 (MM 2240) was a probable breeder.

A final record that suggests breeding in the Delta Marsh area was a juvenile saw-whet owl flushed on 16 July 1981 (SGS). Although this bird could fly, its presence at this time suggests fledging from a nest at or near Delta Marsh. On 19 July 1981, a juvenile, possibly the same bird, was captured in a mist net approximately 1.2 km west of where the individual had been flushed (SGS, H. E. den Haan pers. comm.).

The first nest for the area was found on 29 May 2000. On 15 May, TJU had found an adult saw-whet owl roosting in a shrub on the property of the Delta Waterfowl and Wetlands Research Station. Another adult or perhaps the same individual was spotted on 23 May about 1.5 km west of the first sighting. The owl at the second location remained for at least a day, but was gone on 26 May. On the morning of 28 May, presumably the same owl was roosting in a small spruce (*Picea* sp.) approximately 25 m northwest of where it was seen on 23 May. This site was apparently a favored perch because on 29 May, 17 pellets were found on the ground beneath it and feces had begun to accumulate. Later that afternoon, TJU and Robyn Underwood located a large hole, roughly 8-9 cm in diameter, probably excavated by a Northern Flicker in a snag 6 m north of the perched bird. Using a TreeTop Peeper 2™ nest inspection camera attached to an extendable pole, the cavity was examined that day and again on 31 May. At least five young saw-whet owls were observed in the cavity (Figure 1). The nest was 3.9 m high in a 4.2 m high snag that was approximately 50 cm in diameter at breast height. The nest was not visited again and the outcome of the breeding attempt was not determined.

Although saw-whet owls nest in various forested habitats, coniferous or mixed coniferous and deciduous forests appear to be preferred.[6, 16] The 15 saw-whet owl nests from Manitoba reported in the Prairie Nest Records Scheme were from areas described as or characterized by a mixture of spruce and aspen or poplar (*Populus* spp.) forest. Nests were located in Marchand, Whitemouth, Birds Hill Provincial Park, Grand Beach, and Riding Mountain National Park. Two other nest records from nest boxes located in southeastern Manitoba (Lonesand and McMunn) were also from mixed coniferous and deciduous forest (J. Duncan pers. comm.).

Breeding of saw-whet owls at Delta Marsh is interesting because of the habitat available. This area is characterized by a dune-ridge forest that separates the shore of Lake Manitoba from an extensive marsh (~15,000 hectares) of open bays surrounded by cattails (*Typha* spp.) and reeds (*Phragmites australis*).[17, 18] The forest averages 80 m in width and is composed almost entirely of

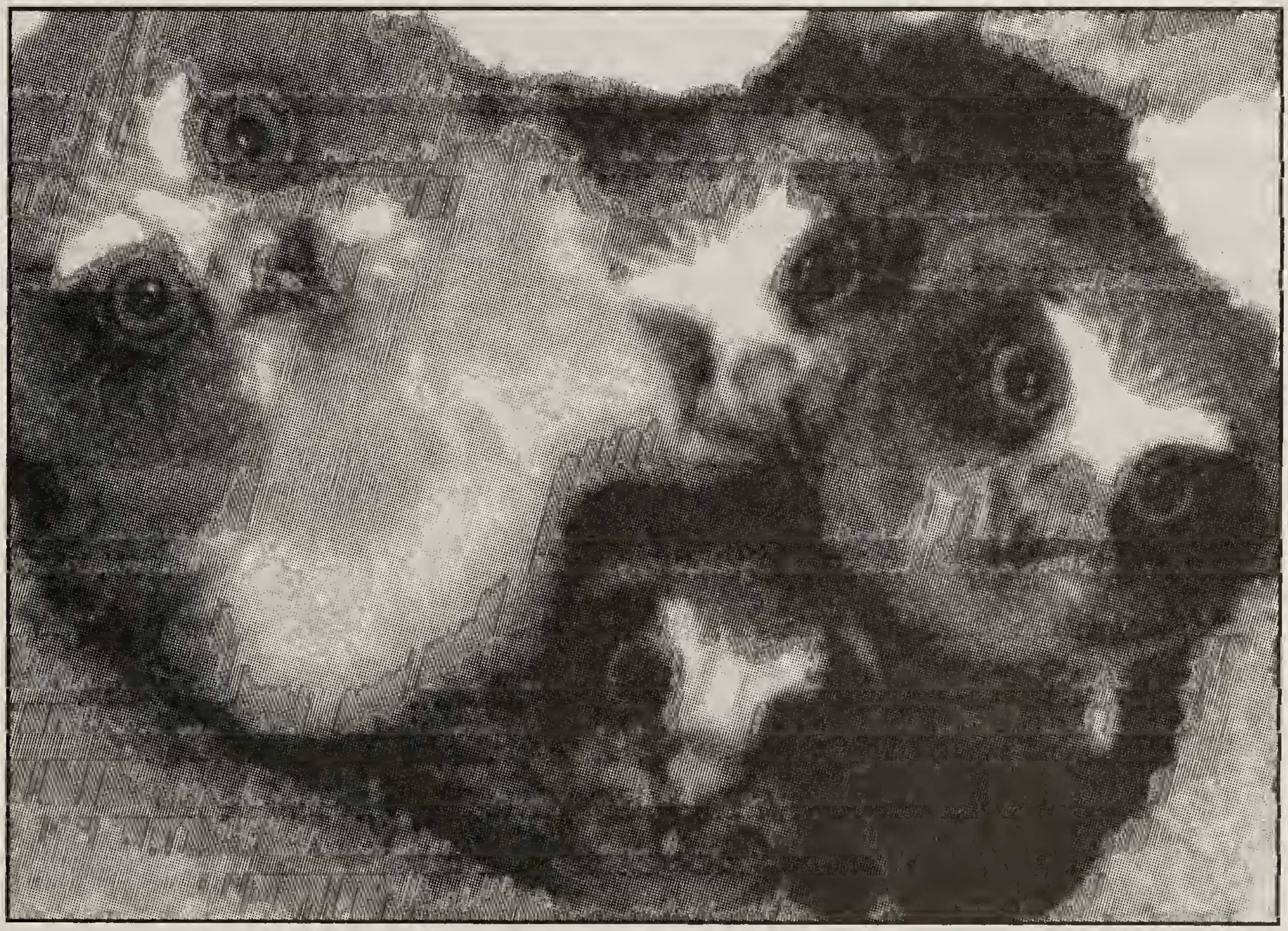

Figure 1. Northern Saw-whet Owl brood at Delta Marsh, Manitoba, 31 May 2000, from inside the nest. Image taken using a cavity nest inspection camera placed into the nest hole.
T. J. Underwood.

deciduous trees and shrubs, such as Manitoba Maple (*Acer negundo*), Green Ash (*Fraxinus pennsylvanica*), Peach-leaved Willow (*Salix amygdaloides*), and Sandbar Willow (*S. exigua*).[18] South of the marsh are small bluffs of Bur Oak (*Quercus macrocarpa*) and aspen along with agricultural fields and small patches of prairie.[17] The few conifers present are mostly small ornamental spruces planted near cottages and houses. Delta Marsh is not, however, a unique breeding site. Saw-whet owls have nested in some riparian areas characterized by deciduous woods in British Columbia,[5] Idaho,[20] and Saskatchewan.[1, 4, 22]

Diet

The diet of saw-whet owls in the non-breeding season has been well studied.[6, 7, 12, 14, 23, 25] Mammals, especially deer mice (*Peromyscus* spp.) and voles (*Microtus* spp.), comprise more than 90% of the prey items taken,[6] except for the subspecies (*Aegolius acadicus brooksi*) on the Queen Charlotte Islands, British Columbia, where marine invertebrates comprise about 50% of the diet.[23] Only mammals were recorded in a report on the diet of saw-whet owls from Alberta.[24] Deer Mice (*P. maniculatus*), Meadow Voles (*M. pennsylvanicus*), Red-backed Voles (*Clethrionomys gapperi*), and shrews (*Sorex* spp.) were identified from pellets collected at various times of the year, although most were from "summer".[24]

Relatively little is known about saw-whet owl diet during the breeding season and most studies are from western North America.[6, 7] Mammals also comprise most of the diet, with birds accounting for less than 2% of the total prey items.[5, 15, 20, 21] Deer mice, voles, Pocket Mice (*Perognathus parvus*), Harvest Mice (*Reithrodontomys megalotis*), and House Mice (*Mus musculus*) are the most numerous prey items recorded.[5, 15, 20, 21] Even less information is available on breeding season diet from the prairie provinces. In Alberta, unidentified rodents were observed being delivered to a brood.[15] Several prey items also were found in two occupied nest boxes in southeastern Manitoba. A box from Lonesand contained three Meadow Voles, one Meadow Jumping Mouse (*Zapus hudsonius*), one American Redstart, and one unknown passerine nestling, whereas a box from McMunn contained a single Deer Mouse (J. Duncan pers. comm.).

At Delta Marsh, we collected 17 pellets on 29 May 2000 at a roost site near the active nest described above. Sixteen of these pellets averaged 27.6 mm ± 1.4 SE by 14.8 mm ± 0.35 SE (length by width) and 1.0 g ± 0.08 SE in mass. (The 17th pellet broke apart before measurements could be made.) Dissection of the pellets revealed 14 prey items (Table 1). Not every pellet contained a single prey item, a few had mostly fur and only a few small bones. Saw-whet owls often cast two pellets for a single prey item eaten.[6, 25] Mammal species were identified and numbers estimated by the sets of skulls and lower jaws. The number of birds was estimated by the number of mandibles. Most items were mammals but birds were common as well. Due to their relatively lower mass, the percentage of birds in the diet decreased by a third when diet was expressed on the basis of biomass (Table 1).

Of the nine mammals identified as prey, eight were Red-backed Voles and one was a Meadow Jumping Mouse. The only bird identified to species was a Least Flycatcher based on a band on its tarsus. This bird had been banded as an adult on 17 July 1998 by the Delta Marsh Bird Observatory and, thus, was approximately 3 years old (or older) in the spring of 2000. The remains of four other birds were not identified because only the breastbones and portions of the skulls and lower mandibles were present. Based on size, we identified these as unknown passerines. In addition to prey from pellets, the adult owl observed on 23 May 1999 was holding the hind half of a jumping mouse (probably *Z. hudsonius*).

In contrast to other breeding or non-breeding season studies, our data from Delta

Marsh, albeit based on a small sample from a short time period, show a fairly high percentage of birds in the diet (Table 1). Other researchers have noted a consistent increase in the frequency of birds in the diet during the spring migration of songbirds.[7,12] This increase in songbirds may explain the high percentage of birds we found. Based on the production of one pellet per day,[12] the 17 pellets collected were produced approximately between 12 and 28 May. These dates coincide with the peak songbird migration and the initiation of nests of several species at the study site.[3,11] Delta Marsh is an important migration corridor and supports high densities of breeding songbirds.[3,9,11,19] Thus, the breeding season diet of saw-whet owls at Delta Marsh likely reflects the high availability of songbirds, but more data are required to confirm this trend.

Acknowledgments

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Table 1. Analysis of 17 Pellets of the Northern Saw-whet Owl at Delta Marsh, Manitoba, Collected on 29 May 2000.

Prey Items	**Mean mass (g)**	**Number**	**% of total**	**% biomass**
Red-backed Vole	16.7[a]	8	57.1	66.4
Meadow Jumping Mouse	16.8[a]	1	7.1	8.3
Subtotal		9	64.3	74.8
Least Flycatcher	10.8[b]	1	7.1	5.4
Unknown passerines	10.0[b]	4	28.6	19.9
Subtotal		5	35.7	25.2
Total		14	100.0	100.0

[a] Mammal masses were taken from specimens in The Manitoba Museum and the University of Manitoba Zoology Museum. The masses of pregnant or lactating females were excluded. Red-backed Vole masses (n = 34; 19 males, 14 females) were from specimens collected at Delta Marsh and Winnipeg, Manitoba. Meadow Jumping Mouse masses (n = 23; 12 males, 11 females) were from specimens collected throughout Manitoba.

[b] Bird masses were obtained from birds mist-netted during 21-27 May in each of 1976 through 1983 at Delta Marsh.[2] Least Flycatcher masses (n = 102, both sexes). For unknown passerines, Yellow Warbler mass was used (n = 178, males) as a model small passerine because this species is the most abundant small songbird nesting at Delta Marsh.

Station (University of Manitoba) for providing logistical support.

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HABITAT FEATURES IMPORTANT TO BURROWING OWL BREEDING SUCCESS IN SASKATCHEWAN

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Burrowing Owls are unique among owls in that they nest in mammal burrows (usually ground squirrel or badger burrows in western Canada). They nest as solitary pairs or small loose colonies in open pastures with short grass, and also use taller grass-forb areas for hunting.[2,8,9,22] The Burrowing Owl has been classified as an endangered species in Canada since 1995.[24] The Saskatchewan owl population declined about 95 percent between 1987 and 2001, and the species range has been shrinking southward and westward since the 1940s (Nature Saskatchewan unpublished data).[10,19] Habitat loss and fragmentation have been identified as the ultimate factors in the decline of the owl population in Saskatchewan.[2,21,24] In 2000, only 20 percent of former grasslands in Saskatchewan remained as natural habitat, and in highly arable areas it was as low as two percent.[7] The Operation Burrowing Owl (OBO) program, delivered by Nature Saskatchewan, was launched in 1987 to protect grassland habitat for Burrowing Owls through voluntary landowner stewardship.[19]

Intensive studies of the Burrowing Owl in Saskatchewan since 1982 have looked at breeding biology and productivity, diet and foraging strategies, population dynamics, dispersal, migration mortality and post-fledgling ecology.[2,13,18,20,21,23] The only study of the relationships of habitat patterns and owl population dynamics across the owl's range in Saskatchewan examined population turnover but not breeding success.[21] In 2000, the authors undertook a pilot study of habitat features that might be important to owl breeding success; this was conducted in conjunction with a program to visit all OBO members with nesting owls. The goal of the study was to determine whether habitat features play an important role in breeding success, and to identify those that would merit further study.

Methods

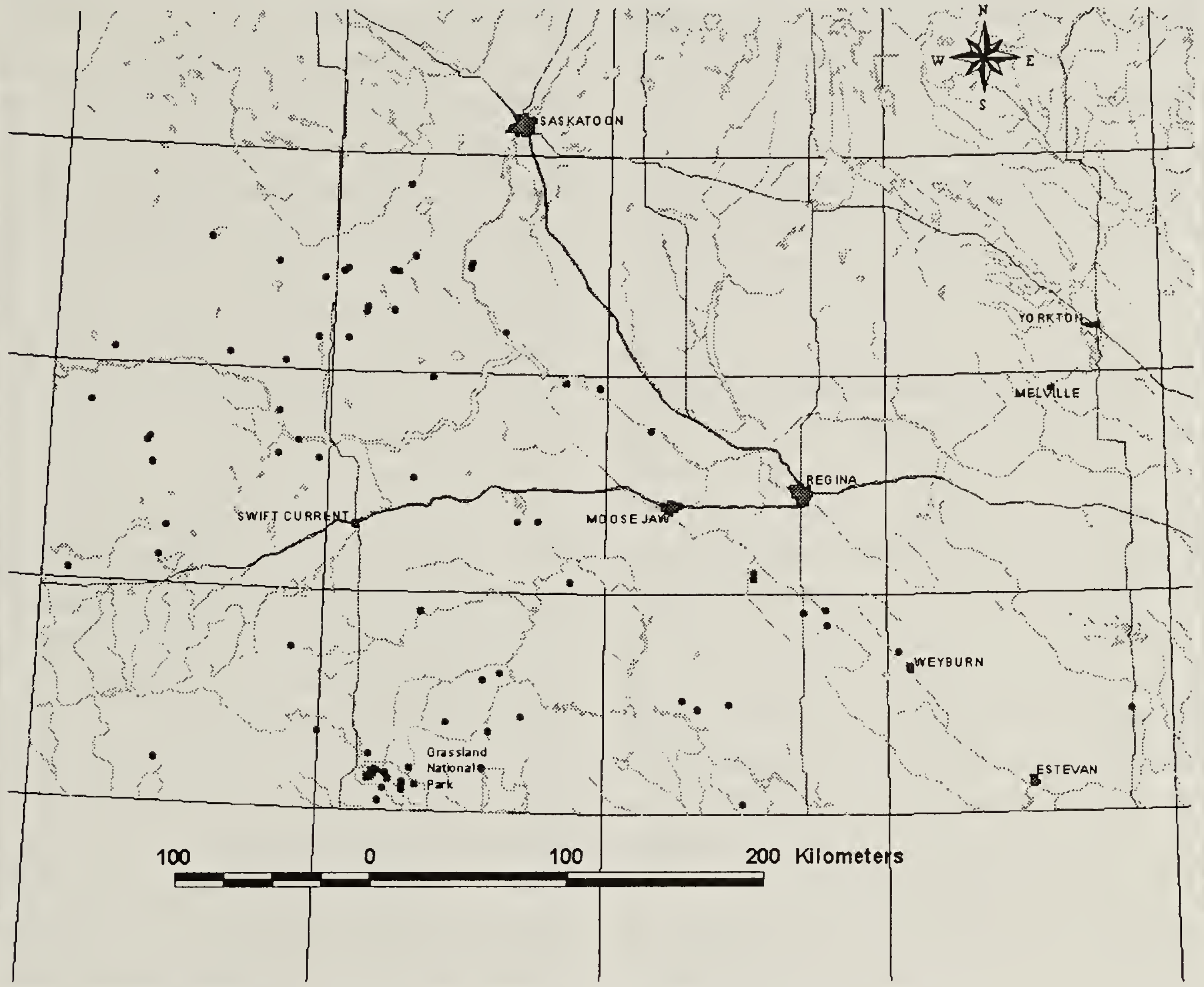
The study area included all known active OBO and Grasslands National Park (GNP) nest sites across the Burrowing Owl's current range in southern Saskatchewan (Figure 1). By early July, landowners, public land managers and Burrowing Owl researchers had reported locations and numbers of nesting Burrowing Owls and their young to OBO. Each reported owl nest site, as well as known active nest sites in GNP, was visited at least once between July 14 and August 25 to determine breeding success or failure, and to measure habitat characteristics. A total of 92 nest sites were visited.

A successful owl nest was defined as having at least one fledgling surviving to 42 days of age.[4] Most fledglings appear above ground around the end of June and stay close to the nest burrow for several weeks. Owl fledglings were identified in the field by their unmarked buffy or yellowish beige bellies; in contrast, adult owls have numerous darker brown spots on the belly. A failed nest was defined as one that was destroyed or abandoned, or one with no fledglings seen by landowners or biologists after June 30. It was logistically impossible to regularly check all nests and use the Mayfield method to estimate overall breeding success.[14] Therefore, we used the apparent estimator ([number of successful nests/ total nests observed]*100) of nesting success, recognizing this estimator may be inflated due to lower likelihood of finding failed nests.[15]

Twenty-one habitat characteristics selected for likely biological importance, potential statistical significance, and ease of measurement, were measured at each nest site. Habitat parameters recorded at each site included surrounding land use (200 m and 2 km radii); distances to nearest road, closest owl pair, and farmyard; presence of one or more wetlands within 2 km; nest type (natural or nest box); presence or absence of grazing; soil type (from soil maps), and habitat type (pasture, grass patches in cropland or roadside). Also noted by abundance category (for simplification and time savings in the field) were badger holes, ground squirrel hole clusters, owl perches, utility poles, nearby farms and single trees. Badger holes were distinguished from Richardson's ground squirrel holes by larger size (30 cm in diameter as compared to the 7-8 cm diameter for ground squirrels) and larger mounds of soil at the entrance. All examined badger holes appeared to be inactive. A ground squirrel hole cluster represented a tunnel system for a single adult ground squirrel. A hole cluster usually contained five to fifteen holes. A minimum gap of 10 m between hole clusters was used to delineate separate hole clusters.

Burrowing Owl ***Brian K. Jeffery***

Figure 1. Burrowing Owl habitat survey sites in 2000.



Since the majority of reported owl foraging movements are within 200 m and 2 km radii of nests during the day and at night, respectively, in Saskatchewan, we used these two radii to calculate percentages of land use types around owl nests.[9] All characteristics, except for the land use parameters within a 2 km radius of owl nest sites, were measured in the field during a site visit. Land use within a 2 km radius of each owl nest was calculated using the Saskatchewan Digital Land Cover map that was created from LANDSAT satellite imagery taken in 1992 and 1993. Areas within a 2 km radius of Burrowing Owl nest sites were selected in ArcView 3.2 and cover types by area were determined using Spatial Analyst (an ArcView GIS extension) and then converted to percentages.[5] To reduce the number of variables in the analysis, we combined the 24 standard satellite imagery cover classes on the map into four broad cover types: grassland, farmland, wetland and forest. Where there were discrepancies between the map and ground-truthing in the immediate vicinity of the nest. (as was true for 20 % of sites in the agricultural landscape), areas and percentages were adjusted.

Non-parametric statistics were used as the data lacked normality after transformation attempts, had non-linearity and had unequal variances.[25] Multivariate analysis was thus precluded. In addition, relatively small sample sizes (<100), and limitations in precision of measurements and use of some categorical variables, also contributed to the decision not to use multivariate statistics. Mann-Whitney U-tests and Chi-square (Π^2) tests were used to compare successful nests to failed nests, as well as to compare habitat characteristics at owl sites in the agricultural landscape with characteristics in GNP.[25] We used a statistical significance level of $P\leq0.05$ unless otherwise indicated.

Owl nesting data from the same locations in GNP in 1998 (17 nests) and 1999 (28 nests) were added to our 2000 data to increase sample sizes of successful and failed nests (Geoff Holroyd, unpublished data). All owl nest sites in GNP occurred in Black-tailed Prairie Dog colonies, and there were no changes in the habitat of these colonies between years (Geoff Holroyd, pers. comm.).

Results

Of the total of 92 Burrowing Owl nest sites examined in 2000, 67 were in the agricultural landscape (65 on privately owned land and two in Prairie Farm Rehabilitation Administration pastures), and 25 nest sites were in Grasslands National Park (GNP). A total of 111 adults and 133 fledglings were counted during site visits. In the agricultural landscape, 62 solitary pairs and one loose colony of nesting owls were recorded (five pairs in one privately owned quarter-section south of Regina). In contrast, GNP in 2000 had a higher proportion of colonies; five different quarter sections in GNP had two to four pairs each, totalling 13 pairs, in addition to the 12 solitary pairs in other quarter sections.

Breeding Success

Owl breeding success did not differ ($P>0.05$) between the agricultural landscape and GNP, and was 68% overall (agricultural landscape, 66% or 44 of 67 sites; GNP, 76% or 19 of 25 sites). Breeding failure was attributed to predation (7 sites), flooding due to record rainfall (2 sites near Vanguard), land breakage (1 site), cattle trampling (1 site), burrow collapse (1 site), severe weather in GNP (6 sites) and unknown factors (11 sites).[11]

Agricultural Landscape vs. Grasslands National Park

Burrowing Owl nest sites in the predominantly agricultural landscape outside GNP differed significantly from sites in Grasslands National Park (GNP) in which all were in prairie dog colonies. Appendix 1 lists the habitat characteristics that differ significantly between nest sites on agricultural land vs. GNP. Nest sites in the agricultural landscape were surrounded by more farmland (at 200 m and 2 km radii), less grassland (at 200 m and 2km radii) and less wetland (at 2 km radius) than nest sites in GNP. Owl sites in the agricultural landscape had more fence line length, roads, single trees, utility poles, owl perch sites, occupied farms, badger holes, and ground squirrel hole clusters surrounding them than owl sites in prairie dog colonies in GNP. In addition, owl nests in the agricultural landscape were also closer to roads and farms, and had fewer abandoned nearby farms. Because of the differences in the landscapes, we looked at the agricultural landscape separately from GNP when we analyzed these habitat characteristics at successful vs. failed owl sites.

Successful Nests vs. Failed Owl Nests in the Agricultural Landscape

In the agricultural landscape, four habitat characteristics showed a significant difference between successful and failed owl nests (See Table 1). Compared to failed nests, successful nests had more Richardson's ground squirrel hole clusters and more badger holes within 100 m of the nest. Also, successful nests had fewer single trees within sight and a higher percentage of wetland within 2 km of the nest, than did failed nests. Owl sites with nearby wetland areas (46 sites) had a nesting success of 76% vs. 43% for sites with no nearby wetland (21 sites). There were no statistically significant relationships between breeding success and the following habitat characteristics: distance to next nearest owl pair, distance to nearest road, and number of potential owl perches.

Successful Nests vs. Failed Owl Nests in Grasslands National Park

Two habitat characteristics differed significantly between successful and failed owl nests in GNP during 1998-2000. Successful nests were closer to farmyards ($P<0.05$), and also closer to roads ($P<0.10$), than failed nests (Table 1).

Nests in GNP were mostly located near riparian habitat along valley bottoms in 1998 to 2000. In 2000, there was a negative relationship between breeding success and wetland area within 2 km of nests: wetlands comprised an average of 18% of the area around 19 successful nests compared to an average of 30% around 6 failed nests. Breeding success was 78% (23 sites) for sites with one or more wetland areas within 2 km and 50% for sites (2 sites) with no wetland areas within 2 km of nests.

Other Habitat Features

Owl breeding success differed significantly ($P<0.05$) in terms of grassland land use practice, and was 50% at sites with no grazing or mowing (8 sites), 25% at sites that were mowed (4 sites) and 73% at sites with grazing (80 sites). Nesting success did not differ significantly between natural nests (67%, 82 sites) and artificial nest boxes (80%, 10 sites). It also did not differ significantly among broad soil groups, and was 59.2% in lacustrine soils (27 sites), 78.6% in alluvial soils (28 sites), 73.1% in morainal soils (26 sites) and 54.6% in other soils (11 sites). In a comparison of habitats, breeding success was 71% in pasture (86 sites), 50% in small grass patches (<0.1 ha) in cultivated fields (2 sites), and 25% in roadsides (4 sites).

Discussion

Breeding Success in the Agricultural Landscape

In the agricultural landscape, more nearby Richardson's ground squirrel hole clusters and more badger holes, fewer nearby single trees, presence of nearby wetlands and amount of wetland area within 2 km were shown to be important to owl breeding success.

Ground squirrel and badger holes are important in providing a selection of nest and roost sites, as escape terrain and for juvenile dispersal.[18] Other studies have shown that adequate burrow availability is a basic habitat requirement for Burrowing Owls.[3, 8] For example, occupied owl sites were found to have a greater density of ground squirrel holes than unoccupied nest sites on the Regina Plain in Saskatchewan.[12]

Trees are used as nest sites and perches by larger raptors, and raptors are significant predators on juvenile owls.[20] Other studies have shown that a lack of trees is another basic habitat requirement for Burrowing Owls.[8] Over time, lower owl densities and nest persistence were found in areas with more trees near Hanna, Alberta.[2]

The proximity and amount of wetland habitat are important as a source of additional prey for Burrowing Owls because these habitats support enhanced insect and small mammal populations; owls are known to glean insects from the taller vegetation.[9] Increased food availability can boost fledgling success in Burrowing Owls.[23] Rodents and shrews may benefit from the additional food and cover provided by taller vegetation, and become vulnerable to predation by owls while traversing in open areas or along habitat edges.[2, 16] However, it is important to note that wetland areas in this study were determined from satellite imagery taken in 1993, and these areas may have varying levels of water in different years. In addition, the positive correlation between owl breeding success and wetlands needs further investigation because our study grouped together diverse types of wetlands that differ in hydroperiod, hydrology and faunal and floral communities.

The lack of a relationship between breeding success and distance to next nearest owl pair, distance to nearest road, and numbers of potential owl perches in the agricultural landscape differs from studies in Oregon and Colorado.[6, 17]

Breeding Success in GNP

In contrast to the agricultural landscape, in GNP there was no apparent relationship between owl breeding success and numbers of nearby burrows and trees. Owls nested within prairie dog colonies where there was no shortage of available holes. There were fewer trees in GNP than in the agricultural landscape, which may account for the lack of a difference in the number of single trees between successful and failed nests.

A negative relationship between wetland area and owl breeding success in GNP in 2000 was likely due to flooding caused by a severe thunderstorm (with record rainfall north of GNP) in July 2000 at a small sample size of failed nests.[11] With the addition of 1998 and 1999 owl data, this negative relationship disappeared. However, risk to young owls of predation may be lower in grassland areas than in riparian or wetland areas.[16] Although sample size is small, higher breeding success with presence of nearby wetland areas in GNP is consistent with the importance of nearby wetland areas to breeding success in the agricultural landscape. The presence of wetland areas in GNP is likely important.

Factors that increased breeding success in GNP in 1998-2000 were proximity to farmyards and roads. This may be due to reduced distances to potential feeding areas. Burrowing Owls are known to use roadside areas as feeding areas, and these foraging areas were within the owl's maximum foraging distance of 10 km (Robert Sissons, unpublished data).[9] In Colorado, a positive relationship between proximity to roads and burrow occupancy by Burrowing Owls in prairie dog colonies was found in 1990 but not in 1991.[17] The foraging advantages along roads and in farmyards may outweigh the risks of collision with vehicles and predation by domestic pets. As in the agricultural landscape, in GNP we found no relationship between breeding success and distance to next nearest owl pair, and number of potential owl perches.

A lack of relationship between breeding success and other habitat characteristics in GNP may be due to the uniformity of prairie dog colonies and spatial autocorrelation. Spatial autocorrelation is the correlation of variables in reference to spatial location of the variables. Spatial autocorrelation of variables likely occurred in GNP as five different quarter sections had 13 of 25 recorded owl pairs (2 to 4 pairs per quarter-section, 10 successful nests, 3 failed nests) in 2000. However, prairie dog colonies provide good habitat and are known to be important for Burrowing Owls: studies in the United States have shown that declines of these owls are correlated with declines in prairie dog colony size, and smaller and isolated prairie dog colonies suffer from higher nest predation.[1,4] In contrast, spatial autocorrelation in the agricultural landscape was minimal as occurrence of more than 1 pair of owls in the same quarter section was rare (1 of 63 quarter-section cases).

Other habitat features

Breeding success was significantly lower at sites without grazing (sites with no grazing or mowing, and mowed sites) than sites with grazing in the agricultural landscape. Although mowed areas may resemble naturally grazed areas in having shorter vegetation, disturbance from people and mowing machines could lower owl breeding success; further research on mowing effects is needed. These results generally support previous studies in illustrating the importance of grazing and keeping vegetation short around nest and roost burrows.[2,12] In GNP, all owl nest sites were in heavily grazed prairie dog colonies and there were no visible differences in grazing between successful and failed owl nests.

Our sample size of artificial nest boxes may be too small to allow detection of a difference in breeding success between these sites and natural burrows. However, breeding success measured by nest survival and number of young produced was higher in artificial nest boxes than natural nests in the Regina Plain in recent years.[23]

Limitations

We recognize the following limitations to our study: small (<100) sample sizes, most data was from one breeding season, inability to monitor nests at least once a week for a more precise assessment of breeding success in order to use of the Mayfield estimator of daily survival, use of simplified habitat features (e.g. wetland types) and categorical variables (e.g. number of badger holes) in analyses, and data that did not allow us to use multivariate statistics. Multivariate statistics can be used to reduce spurious statistically significant univariate relationships, to examine interacting variables together, and to examine spatial autocorrelation in variables between nest sites. Although there were these limitations, the results of our study indicate there is a relationship between some habitat features and Burrowing Owl breeding success in Saskatchewan that merits further investigation.

Conclusions

Habitat considerations useful in management of areas with Burrowing Owl nests in the agricultural landscape include the importance of badger and ground squirrel populations, the negative effect of presence of trees on owl breeding success, the positive effect of presence of wetland areas, and grazing near nest sites. In GNP, abundant holes, lack of trees, sufficient wetland areas and grazing levels are likely more consistent at potential nest sites across the landscape and, if maintained, (e.g. maintaining prairie dog colonies), are of less management concern. By including the effect of these habitat features when taking management actions, we may increase Burrowing Owl breeding success.

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Table 1: Habitat characteristics that differed significantly ($P<0.05$) between successful and failed Burrowing Owl nests in Saskatchewan.

Agricultural Landscape	**44 Successful Nests**		**23 Failed Nests**	
Habitat Characteristic	**Mean**	**SE$^+$**	**Mean**	**SE**
Number by category of ground squirrel holes within 100 m of nests*	3.3	0.2	2.7	0.2
Number by category of badger holes within 100 m of nests*	3.2	0.1	2.7	0.2
Number by category of single trees seen (>50 m from other trees)**	1.5	0.2	2.4	0.4
Estimated % of land use within 2 km of nest as WETLAND***	7.4	1.8	2.9	1.2

Grasslands National Park******	**47 Successful Nests**		**23 Failed Nests**	
Habitat Characteristic	**Mean**	**SE$^+$**	**Mean**	**SE**
Distance to nearest farmyard (m)	3734	423	4590	268
Distance to nearest road (m)	1500	240	2270	364

+SE: Standard error

*Number by category: 1: none; 2: 1; 3: 2-5; 4: >5

** Number by category: 1: none; 2: 1; 3: 2-5; 4: 6-10; 5: >10

***WETLAND -open water, marsh, fen, mud, saline or sand

**** All 1998-2000 owl nesting attempts used in this study were from same locations each year.

Appendix 1: Habitat characteristics that differed significantly ($P<0.05$, unless otherwise indicated) between Burrowing Owl sites in the Agricultural Landscape (Ag Landscape) and in Grasslands National Park (GNP) in Saskatchewan.

Habitat Characteristic	**67 Owl Sites in Ag Landscape**		**25 Owl Sites in GNP**	
	Mean	**SE^{+}**	**Mean**	**SE**
Estimated % of land use within 200 m of nest as FARMLAND (crop, hay, fallow or farmyard)	40.1	3.5	4.8	2.7
Estimated % of land use within 2 km of nest as FARMLAND (crop, hay, fallow or farmyard)	61.3	4.1	1.9	2.7
Estimated % of land use within 200 m of nest as GRASSLAND (tame or native grassland)	54.0	3.5	90.0	4.8
Estimated % of land use within 2 km of nest as GRASSLAND (tall shrub, tame or native grassland)	32.7	3.5	77.7	2.1
Estimated % of land use within 2 km of nest as WETLAND (open water, marsh, fen, mud, saline or sand)	5.8	1.3	20.5	2.2
Total visible fence line length (m)	2507	311	442	164
Number of roads seen	1.5	0.1	1.0	0.1
Number by category of single trees seen (>50 m from other trees)**	1.8	0.2	1.2	0.1
Number of utility poles within 200 m of nests ***	2.5	0.6	0.6	0.4
Number by category of owl perches 3 m or less in height within 100 m of nest**	4.3	0.2	2.2	0.4
Number of occupied farms	1.3	0.1	0.7	0.2
Number by category of badger holes within 100 m of nests*	3.1	0.1	1.1	0.1
Number by category of ground squirrel hole clusters within 100 m of nests*	3.1	0.1	1.0	0.0
Distance to nearest road from nest (m)	218	50	1740	322
Distance to nearest farmyard (m)	1394	217	3025	397
Number of abandoned farms	0.2	0.1	0.4	0.2

$^{+}$ SE: Standard error, *Number by category: 1: none; 2: 1; 3: 2-5; 4: >5, ** Number by category: 1: none; 2: 1; 3: 2-5; 4: 6-10; 5: >10, *** $P < 0.10$

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ADDITIONAL NOTES ON THE DOVEKIE SPECIMEN FROM MANITOBA

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Introduction

The Dovekie (*Alle alle*), or Little Auk, is a high-arctic species that breeds in large numbers on Greenland, Svalbard (Spitzbergen), Franz Josef Land and Novaya Zemlya, with small numbers nesting on Iceland and Baffin Island.[20] Some nesting colonies, particularly in northwestern Greenland, are comprised of millions of individuals.[20] Small numbers of Dovekies also occur in the Bering Sea and adjacent waters and breeding is suspected at several sites.[5] Although nothing is known of the seasonal movements of Dovekies in the Bering Sea, in the Atlantic Ocean, Dovekies winter offshore in low-arctic waters from Newfoundland to northern Norway and occur regularly off Nova Scotia and in the Gulf of Maine, northern Scotland and the North Sea.[20, 31] From time to time, driven by food shortages caused in some years by severe storms, thousands of Dovekies move south of the normal winter range, in the western Atlantic Ocean, as far as Cuba and Madeira.[13] During some of these movements many individuals are blown on to shore, resulting in "wrecks" of dead and weakened birds inland and along the Atlantic coast of North America.[7, 10, 18, 27, 28, 29, 34]

Seventeen Dovekies are known to have reached inland as far as the Great Lakes and surrounding region of North America.[6, 12, 23, 24] One of these was collected north and west of the Great Lakes, along the eastern shore of Lake Winnipeg, in central Manitoba.[1, 11, 16, 22] Additional details pertaining to this specimen are presented in this paper and the circumstances surrounding the occurrence of a Dovekie in Manitoba are examined.

The Dovekie

A Dovekie swimming weakly near the shore of Lake Winnipeg at Warren Landing (53°41'N, 97°52'W), 37 km southwest of Norway House, was collected by Constable James MacDonald on 7 November 1944. The specimen was sent to Gerald W. Malahar, acting supervisor of the Manitoba Department of Natural Resources, who forwarded it to Lawrence T.S. Norris-Elye, curator at the former Manitoba Provincial Museum.[16, 22] The dried, unsexed specimen was eventually deposited in the collection of the (now) Manitoba Museum (number 2303, original number 1219). The bird had been partially eaten by insects or another scavenger; the sternum and ribs on the left side, the left scapula and some vertebrae were exposed, but the plumage was otherwise in good condition (Fig. 1). The white throat sullied with sooty brown and the browner and slightly worn flight feathers (primaries, secondaries and wing coverts) revealed that the bird was in its first winter (Basic I) plumage. By contrast, older birds have even-aged, black feathers on the back and wings.[4] The white spots above the eyes, typical of Dovekies of all ages, were perceptible only as a tiny speck of white feathers above the right eye, as the eyelids of both eyes were shriveled and sunken. Descriptions and illustrations of plumages of nearly fledged nestlings and first-winter birds state or suggest that these spots are smaller than those of older birds.[4, 10, 21]

This is the only record of the Dovekie for Manitoba. This specimen and two collected in Minnesota[12] and two from Wisconsin[24] are the westernmost inland records of the Dovekie in North America, although these localities and those of some of the other specimens taken in the eastern Great Lakes are almost equidistant from the nearest

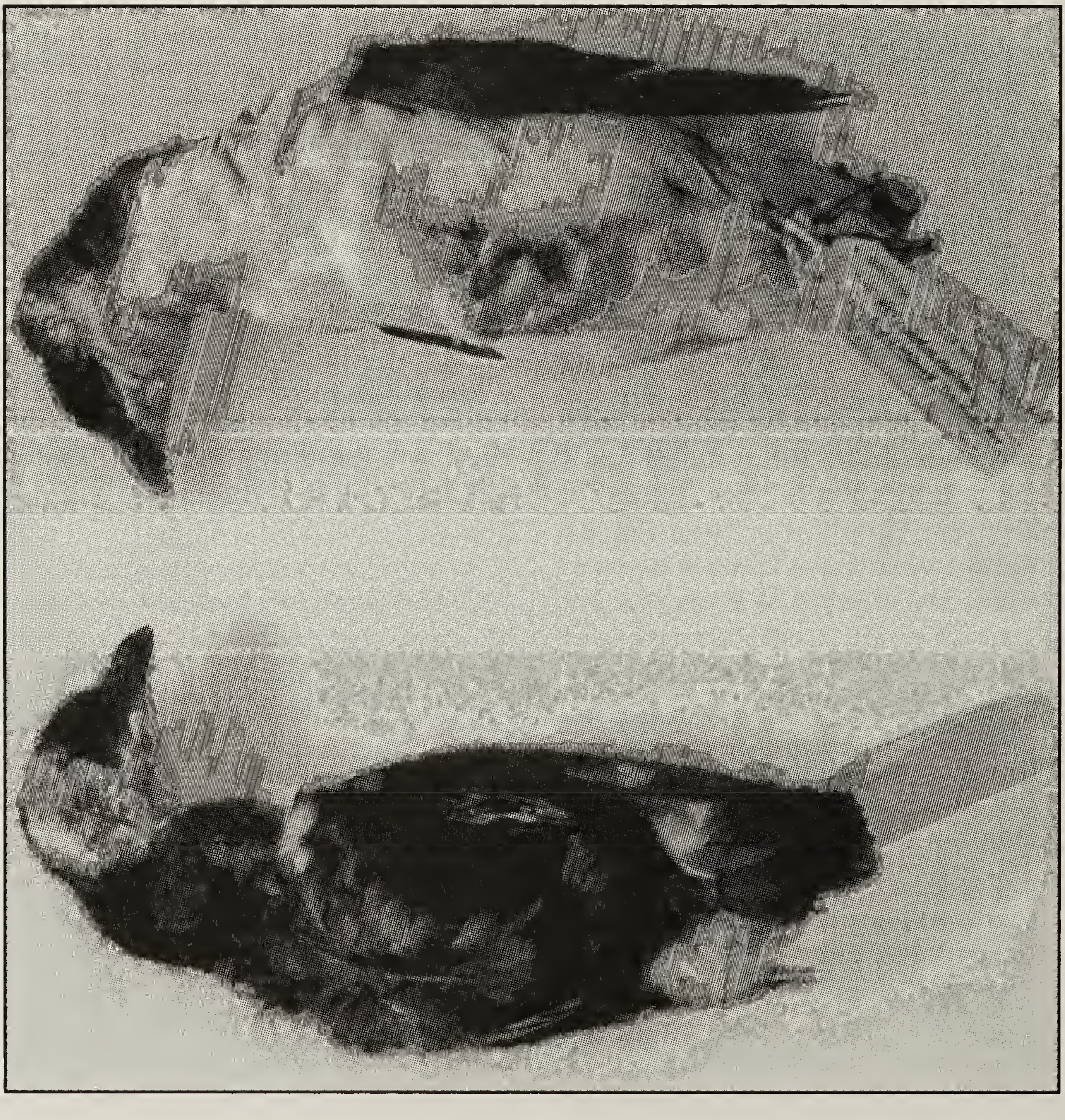

Figure 1. Dovekie (MM 2303) collected on 7 November 1944 near the shore of Lake Winnipeg, Warren Landing, Manitoba. Upper photograph, ventral view; lower, dorsal view.

marine waters, Hudson Bay and the Atlantic Ocean, respectively. But as discussed later, distance to the nearest marine habitat may be inconsequential when the origins of vagrants are considered. One record from South Dakota more than 100 years ago cannot be confirmed.[33] Dovekies have not been recorded off Churchill, in Hudson Bay, but offshore seabird surveys have not been conducted there. Other auks, however, such as Thick-billed Murres (*Uria lomvia*) and Common Murres (*U. aalge*), and, more frequently, Black Guillemots (*Cepphus grylle*), have been recorded in Hudson Bay.[15] Single specimens of the Black Guillemot have been collected inland near Churchill and in southern Manitoba[19] and Ancient Murrelets (*Synthliboramphus antiquus*), inhabitants of the Pacific Ocean, have also been taken, one in Winnipeg and one on the southern basin of Lake Winnipeg.[26]

Origin

We assume that this is a genuine vagrant and not an escapee or an individual whose passage was assisted in any way by humans. Rationale for this assumption has been presented for other auks found far out of range.[17] As well, a Dovekie so far inland in North America is not without precedence. Spanning the years 1881 to 1998, at least 16 other individuals have been recorded, many also in November, on and beyond the Great Lakes (Carter and Sealy, unpublished review).

Two subspecies of the Dovekie are recognized on the basis of size. During the breeding season the nominate subspecies *alle* occurs on Baffin Island, Greenland, Iceland, and Svalbard[20], whereas the larger *polaris* occurs only in the western Russian Arctic, at Franz Josef Land and Novaya Zemlya.[8, 30] Although measurements of individuals from these populations overlap[5, 30], a recent multivariate analysis of external measurements of a large sample of Dovekies, consisting of museum specimens and individuals breeding on Svalbard and Franz Josef Land, confirmed the morphological distinctness of the populations, with *alle* averaging smaller than *polaris* in all dimensions.[30] The Dovekie from Manitoba is referable to *alle* as its measurements (flattened wing, 114.5 mm; exposed culmen, 13.2 mm; tarsus diagonal, 20.9 mm) are at the lower end of the range for this subspecies.[5, 30, 32]

The Manitoba specimen most likely originated from populations in the Atlantic Ocean, which number in the tens of millions, but the possibility remains that this bird originated from the small Bering Sea population. The Dovekie specimens from the Bering Sea have been referred to *alle*[5], but overlap in measurements between populations of the two subspecies made subspecific identification problematic. The Pacific population numbers only in the hundreds, despite the fact that its presence has been recognized only since the 1960s.[5, 10] Nevertheless, vagrants of other species of auks, some also with small breeding populations distributed in the north Pacific Ocean, have been recorded in the interior across North America, the Atlantic Ocean and in Europe.[14, 17, 25, 26]

Vagrancy and route of travel

Gale-force southeasterly winds in the late fall and winter have been linked with some of the large wrecks of Dovekies in eastern North America.[4, 7, 9, 10] Dovekies apparently withstand most storms at sea, but evidence suggests that in some years prolonged gales drive their primary food, planktonic crustaceans[2], to depths greater than Dovekies can reach. Weakened by such storm-induced food shortages or perhaps forced to make longer flights in search of food, Dovekies are prone to being blown inshore and inland.[4, 7, 9, 10, 31] Complicating the picture, however, is the finding that not all large incursions have been linked exclusively with the conditions brought about by severe storms.[34]

The available information suggests that the Dovekie recorded in Manitoba in early November 1944 was one such unexplained occurrence. The weather in east-central Manitoba during five days prior to discovery of the bird was not characterized by unseasonably strong winds or precipitation (Environment Canada, Atmospheric Environment Service). Similarly, no direct link to severe weather conditions at the time and place of inland recovery was associated with a Dovekie shot in late October 1993 near Ottawa, Ontario.[6] None of the other records of Dovekies recorded on or in the vicinity of the Great Lakes was from 1944 nor were any Dovekies reported during the years of the most celebrated wrecks on the Atlantic coast of North America, in November 1891 and November and December 1932.[18] As well, none was recorded during the years that the other 12 smaller flights or wrecks occurred on the eastern seaboard since the mid-1800s.[7, 9]

Many interesting questions remain. First, was the Dovekie blown off course during migration or did it make a navigational error and end up in the interior of Manitoba instead of the waters off northern Newfoundland? Most migratory movements of Dovekies from the massive colonies in northwestern Greenland to the Labrador Sea and eastern Newfoundland waters continue through November and into December (W.A. Montevecchi, pers. comm.). Dovekies from other populations in the eastern Atlantic Ocean, however, winter off southwestern and southeastern Greenland, with birds banded on Svalbard and recovered off southwestern Greenland between November and January.[3, 31]

Second, did the Dovekie fly, possibly assisted by wind, westward along the Gulf of St. Lawrence, through the Great Lakes, to Lake Winnipeg, or did it arrive directly from the high arctic, possibly via Hudson Bay, or overland from the Bering Sea or adjacent waters? A synthesis of the other Dovekie records around the Great Lakes in relation to weather records and the major and minor wrecks over the past 150 years may help shed light on this subject.

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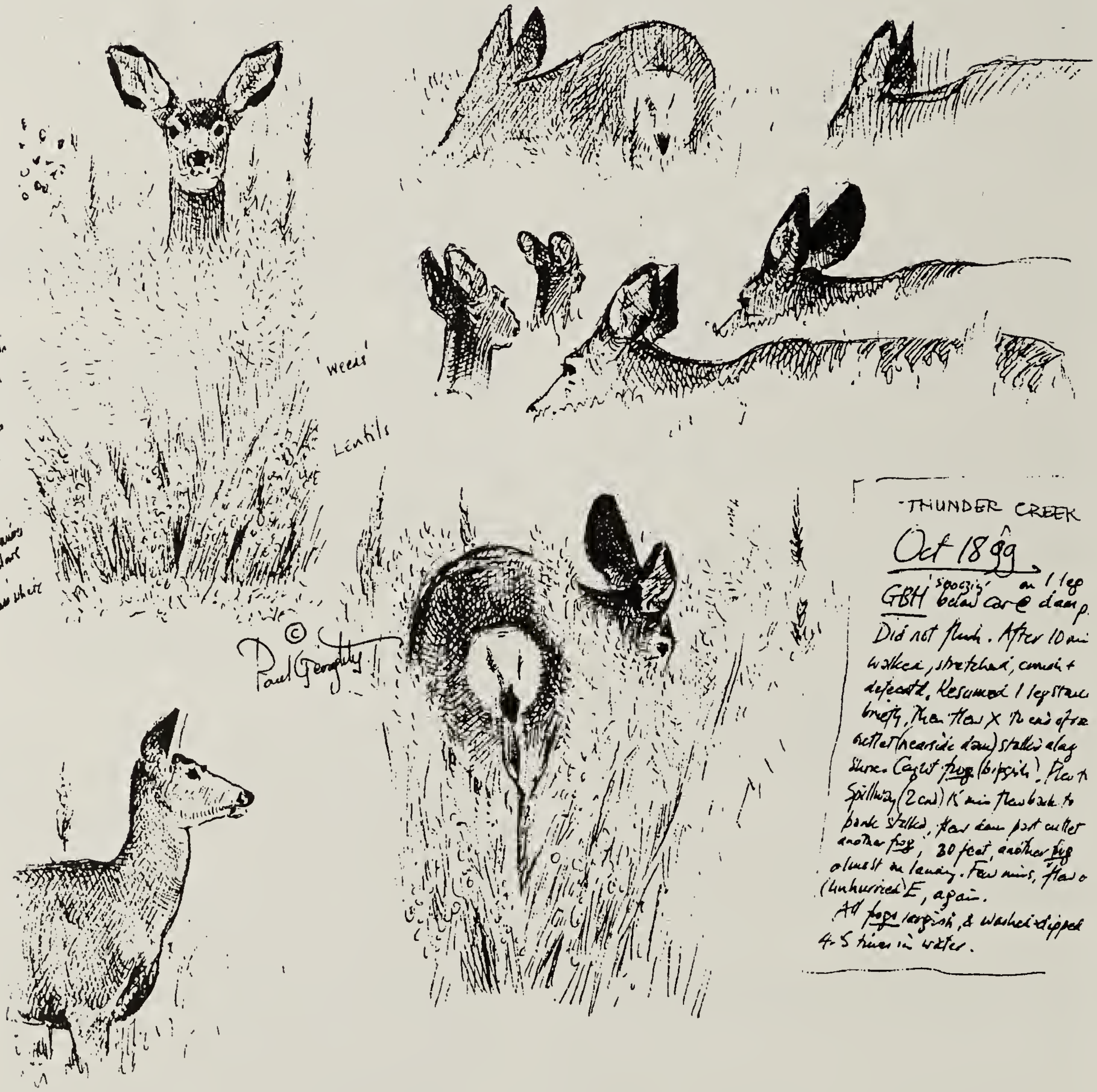
Oct 18 '99

Mule deer

– fawn: ears more vertical in alert than ad. ♀



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THUNDER CREEK

Oct 18 99

GBH 'snoozing' on 1 leg below care dam. Did not flush. After 10 min walked, stretched, combed + defecated. Resumed 1 leg stance briefly, then flew X to end of the outlet (nearside dam) stalked along shore. Caught frog (big girl). Flew to Spillway (2 end) ½ min flew back to bank stalked, flew down past outlet another frog, 30 feet, another frog almost on landing. Few mins, flew o (unhurried) E, again.

All frogs largish, & washed & dipped 4-5 times in water.

2 ♀♀ 2 fawns

PLANTS

WHERE HAVE ALL OUR ASTERS GONE?

VERNON L. HARMS, #212-115 Keevil Crescent, Saskatoon, SK S7N 4P2

Asters *Bernard de Vries*

Where *have* all our asters gone? Well, the plants are still here but their scientific names have been changed. Modern taxonomists no longer place any of Saskatchewan's 16 native aster species in the genus, *Aster*; they have reclassified them into five different genera, although mostly under *Symphyotrichum*.

Numerous plant taxonomic revisions and name changes have recently been made, most in association with the ongoing Flora of North America (FNA) Project and John Kartesz' Biota of North America Project (BONAP).[2] Newly assigned names for many plants of the Saskatoon area were given in my recent article on the flora of Peturrson Ravine.[1] I will not try to discuss the reasons, or pros and cons, regarding the innovations. Suffice it to say that they are generally accepted and will likely be reflected in floras and wildflower guides in the future.

What does this mean to the average naturalist? Not necessarily very much. The plants themselves remain unchanged, and we may continue using their common names as before. Scientific names have their value in "pinning down" exactly what particular plant is being referred to. This is especially important because of the multiplicity and non-standardization of plant common names. The table below summarizes the name changes for our asters and may help some readers to avoid confusion when confronted with the new scientific names.

COMMON NAME	FORMER LATIN NAME	NEW LATIN NAME
Western or Ascending Aster	*Aster ascendens*	*Symphotrichum ascendens*
Boreal or Bog Aster	*Aster borealis*	*Symphotrichum boreale*
Rayless Aster	*Aster brachyactis*	*Symphotrichum ciliatum*
Lindley's Blue Aster	*Aster ciliolatus*	*Symphotrichum ciliolatum*
Showy Aster	*Aster conspicuus*	*Eurybia conspicua*
Eaton's Aster	*Aster eatonii*	*Symphotrichum eatonii*
Many-flowered or Tufted Aster	*Aster ericoides var. pansus*	*Symphotrichum ericoides* var. *pansum*
Creeping White Prairie Aster	*Aster falcatus* var. *commutatus*	*Symphotrichum falcatum* var. *commutatus*
Western Willow Aster	*Aster hesperius*	*Symphotrichum lanceolatum* var. *hesperium*
Smooth Blue Aster	*Aster laevis* var. *geyeri*	*Symphotrichum laeve* var. *geyeri*
Large Northern Aster	*Aster modestus*	*Canadanthus modestus*
Few-flowered Aster	*Aster pauciflorus*	*Almutaster pauciflorus*
Purple-stemmed Aster	*Aster puniceus*	*Symphotrichum puniceum*
Eastern Willow Aster	*Aster simplex*	*Symphotrichum lanceolatum* var. *lanceolatum*
Flat-topped White Aster	*Aster umbellatus* var. *pubens*	*Doellingeria umbellata* var. *pubens*
White Upland Aster	*Aster ptarmicoides*	*Solidago ptarmicoides*

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* * *

> The English called European asters both ‘asters’ and ‘starworts.’ *Aster*, Latin for ‘star,’ referred to the flower’s star-like shape...In 1637 John Tradescant the Younger brought North American asters back from Virginia. These do not seem to have been noticed much until they were hybridized with European starworts. They were later renamed ‘Michaelmas daisies’ in Britain, because when the British family finally adopted Gregory XIII’s revised calendar, the feast of Saint Michael coincided with their flowering....Michaelmas was always a date of beginnings: the academic year at Oxford and Cambridge, the quarterly court session, the day for debts to be settled and annual rents (often including a goose) to be paid. In the garden both Michaelmas daisies and Chinese asters bloom in autumn, magnificent curtain calls of summer but reminders too of new beginnings after winter’s sleep.”
>
> - Diana Wells, *100 Flowers and How They Got Their Names*, p.7-8.

RECORDS OF ALBERTA SMALL MAMMALS THROUGH ANALYSES OF GREAT HORNED OWL PELLETS

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Great Horned Owl ***Jean Harris***

Smith made extensive use of owl pellets for information on the distribution and relative abundance of small mammals in Alberta.[10,11] He examined collections of pellets from the extreme southeastern portion of the province and Drumheller region in support of traditional trapping. While Deer Mice (*Peromyscus maniculatus*) made up the majority of the small mammals taken both by trapping and the owls, he found that owls capture numbers of some species, such as Sagebrush Voles (*Lemmiscus curtatus*) and Northern Grasshopper Mice (*Onychyomys leucogaster*) infrequently captured by museum and other researchers in those areas. Building on Smith's work, we previously examined mammal prey remains in Great Horned Owl pellets collected on the eastern grasslands and southern fringe of the parkland of Alberta.[8,9] Like Smith, we found the prey to include considerable numbers of some species in locations where they were thought to be rare or absent.

Here we describe the results of analyses of Great Horned Owl pellets collected from 25 additional locations in Alberta (Table 1, Figure 1) between June 1999 and September 2000. Most pellets were collected in the western portion of the grasslands and in the parklands north and northwest of the previously sampled areas. As well, some collections were made in areas on the grasslands that had not been sampled previously.

We identified 4031 individual mammals of 29 species in the Great Horned Owl pellets. We found noteworthy distribution records of 11 species and the first occurrence of kangaroo rats in Great Horned Owl pellets from Alberta. As well as adding to the knowledge of small mammal distribution in Alberta, the information is of interest to wildlife managers, as five of the species found are classified as either being of potential conservation concern or "Status Undetermined" by Alberta Sustainable Resource Development.[1]

All of the pellets analyzed were collected in, or directly adjacent to, abandoned buildings. Great Horned Owls roost extensively in buildings, especially on the grasslands where concealed roosts in trees are limited. We frequently observed owls in buildings while looking for pellets and during other activities. The owls roost in buildings year round, though casual observation suggests that use is greatest in midsummer when newly fledged birds, frequently accompanied by an adult, are often encountered.

An important advantage of collecting pellets from buildings is that the pellets are protected from the weather and therefore accumulate over time. In virtually all cases, the owls probably cast the collected pellets over several years. As a result, the remains in the pellets represent an "average" of the prey taken by the owls at all seasons and, doubtless, reflect changes in abundance of prey species. Owl pellet analyses complement traditional research methods. Capture by researchers provides data on microhabitat occurrence, sex, age, weight, parasites, pelage characteristics and much other information not available from remains in pellets, but researchers seldom have the luxury of sampling small mammals at a location over long periods. A few of the collections described here were made in buildings that had been abandoned for over 20 years and some of the pellets collected were probably of similar age. Collections of pellets can be made quite easily. The pellets can be stored and analyzed at a later time. While the analysis of owl pellets is labour intensive, it is much less so than most other methods of sampling small mammals. As a result, pellets from a larger number of locations can be analyzed compared to the number of locations that can be sampled practically for small mammals directly by researchers.

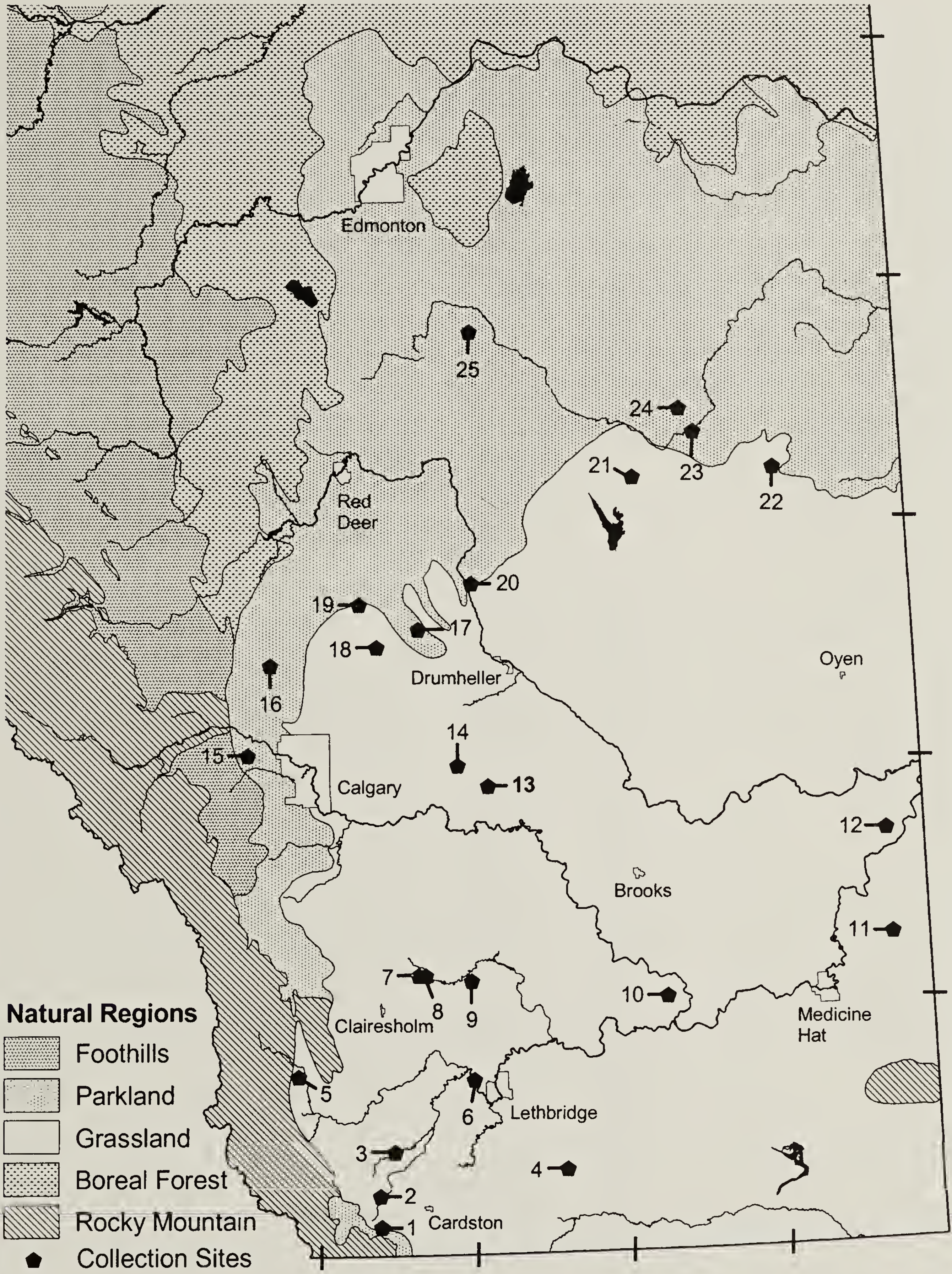
Comparison of prey remains and systematic trapping around roost sites in Colorado suggests that Great Horned Owls take most of their prey near their roosts in prairie habitats in locations that have perches from which the owls can hunt.[14] However, to our knowledge, systematic, year-round, study of the movements of Great Horned Owls in open habitats in Alberta has not been undertaken. It is possible that an owl ate an animal, then travelled some distance before casting a particular pellet. Therefore, new distribution records reported here which are based upon the occurrence of single animals in pellets should be considered provisional.

All identifications of prey remains were by TS. When necessary, identifications were confirmed by comparison to specimens in the University of Alberta Museum of Zoology (UAMZ). Voucher specimens were placed in that museum. The following species have new distribution records in Alberta based on pellet collections between June 1999 and September 2000.

Arctic Shrew (*Sorex arcticus*)

Arctic Shrews are expected to occur in moist environments over the treed portions of northern and central Alberta and along the foothills north from southwest of Calgary. The species is not known from the mountains or grasslands.[12] The Arctic Shrew (UAMZ 10037) from an unused barn south

Figure 1. Location of owl pellet collection sites.



of Linden (Site 18) is in prairie habitat approximately 50 km east of the nearest records mapped by Smith.[12] Currently, the location is quite dry; however the site overlooks a dry stream course with an abandoned beaver dam and patches of willows and aspen. If the specimen was not transported from a distant location, it may have been taken at a time when the local environment was moister.

Nuttall's (Mountain) Cottontail (*Sylvilagus nuttalli*)

Nuttall's Cottontail is a characteristic animal of prairie river valleys and coulees in Alberta.[12] It is also widespread, though

Table 1. Prey remains in Great Horned Owl pellets from Alberta. Species discussed in text are marked with an asterisk.

Species	Location										
	1. Mountain View 18-2-27 W4	2. Leavitt SW 31-3-27 W4	3. Waterton River W 36-5-27 W4	4. Middle Coulee NE 31-4-18 W4	5. N. Cowley SE 24-9-2 W5	6. Spring Coulee 29-9-2 W3	7. E. Stavely NE 9-14-25 W4	8. Little Bow NE 11-14-25 W4	9. E. Carmengay SW 6-14-22 W4	10. Hayes SW 4-13-13 W4	11. SW Schuler 20-15-2 W4
Common Shrew					1		7	5			
Prairie Shrew			1	1	11	1	1	12	2	1	3
Prairie or Common Shrew		3	1	1	2			3	1		
Dusky Shrew				1	1	1	1	3			
Arctic Shrew*											
Water Shrew											
Shrew species											
Silver-haired Bat							1				
Myotis species											
Bat species											
Nuttall's Cottontail*			1			1			9	1	3
Wt.-tailed Jackrabbit				2			8	7	1		1
Snowshoe Hare					4						
Richardson's Grd. Squirrel		4		5		1	5	6	7		8
Franklin's Grd. Squirrel*											
Northern Flying Squirrel*											
Ord's Kangaroo Rat*											
Olive-bckd Pocket Mouse*				1							22
Northern Pocket Gopher*		34			8						
Deer Mouse		118	3	399	114	68	280	228	168	1	91
Nthn Grasshopper Mouse*				21			88	21	28		15
Meadow Vole	2	38	16	37	53	14	26	65	20		15
Southrn Red-backed Vole*											1
Long-tailed Vole*		1									
Sagebrush Vole*	1	22		30	37	3	97	15	40		60
Prairie Vole*											
Muskrat		6		1				4			
Western Jumping Mouse				1							
Jumping mouse species											
House Mouse		2		4	1	3	36				1
Least Weasel		1		1		1	1	2			
Long-tailed Weasel											
Striped Skunk			1								
Total Mammals	3	229	23	505	232	93	546	372	269	3	225
Bird	1	27		29	5	6	51	32	26	2	14
Grasshopper		5		11			1		6		4
Water Beetle				1			10		1		9
Beetle		1	2	1					4	2	
Water Bug		2					2		1		3
Insect		1						7	1		8
Fish		1		10		8		7			
Snake				4		1					1
Frog or Toad		1		1	3		56	1	14		2
Salamander		14	2	4	3	1	4	17	5		14

Table 1 - *continued*

Location													
12. S. Bindloss 20-20-2 W4	13. N. Cluny NE 9-23-21 W4	14.SW Standard SW 19-24-22 W4	15. S. Cochrane NE 35-24-4 W5	16. Madden 12-29-3 W5	17. Swallwell SE 33-30-24 W4	18. Linden SE 4-30-26 W4	19.. W Three Hills 1-32-27 W4	20. Tolman Bridge 2-33-22W4	21. Castor SW 32-37-13 W4	22. NE Coronation 5-38-7 W4	23. Bttle River Brdg 32-39-10 W4	24. NW Battle Bend SE 3-41-11 W4	25. Duhamel 3-45-21 W4
				4			3						
1	1						5	1					1
						2	3						
							1	1			1		
						1	1						
				1									
											3		1
								1					
								1					
	3							1					
	1												
						1	1				1		
	2	5		3			2		3	1			
									1				
											3		
7													
7													
50			1	29		4		1	1	5	5	6	10
33	195	190	4	130	16	20	178	68	3	8	31	7	5
9	5	7				2			3	2	1	1	
10	22	28	1	49	2	7	79	11	2	3	66	2	5
							12	1		1	16	2	2
				2									
5	15	1								6			
			1	23			20		1	2			1
	1			1		1	2						
	4	1											
							1	1					1
	1	7		7		2							2
				1			2						
	1												
122	251	240	7	250	18	40	312	87	14	28	129	18	28

	16	10	2	9		14		78	3		7	1	
	1			1		6							
	6	1				2					6	1	
	2												
		1		4	1	1		1			8		
								1					
				1							4		1
	1			1			6	76			5		2
	2			3	4	1	11	9	2		7	2	40

Nuttall's Cottontail *Andrius Valadke*

less conspicuous, in locations offering some cover away from the valleys and coulees.[9,11] The Nuttall's Cottontail (UAMZ 10100) from along the Waterton River (Site 3) is approximately 50 km northwest of the nearest records reported by Smith (1993) and is the first occurrence from along that river. Treed areas and considerable brush around the site near the river are suitable habitat for this species improving the possibility that additional confirmatory records in the area can be found.

Franklin's Ground Squirrel (*Spermophilus franklinii*)

Franklin's Ground Squirrels are expected throughout the parkland of Alberta except in the southwest portion of that natural region.[2] Occurrences of the species are of note as it is currently classified as being of "Undetermined" status in Alberta.[1] An aggregation of the squirrels lives around an abandoned grain bin partially filled with oats near Castor (Site 21). A Great Horned Owl resident in the upper part of the building had taken at least two of the squirrels, one of which was found partially eaten (Figure 2). Franklin's Ground Squirrel bones from a fresh pellet, which very likely represents portions of the partially eaten ground squirrel, have been placed in the University of Alberta Museum of Zoology (UAMZ 10032). The site is approximately 30 km south of previous records.[2,12]

While there are no specimen records, Franklin's Ground Squirrels have been seen in the Byemoor area, 35 to 40 km southwest of the Castor location, since at least the The

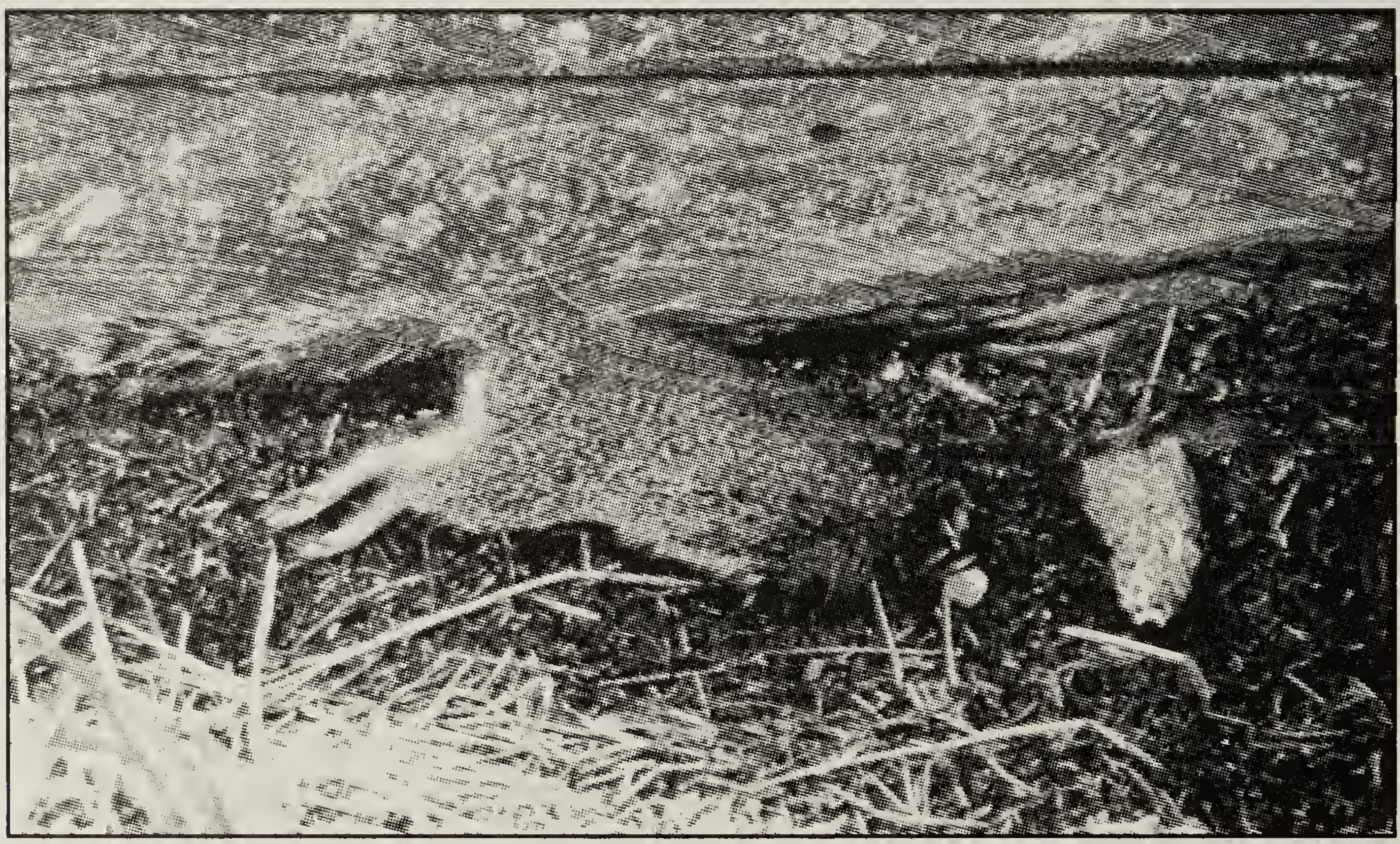


Figure 2. Partially eaten Franklin's Ground Squirrel and fresh Great Horned Owl Pellet that contains parts of the ground squirrel.

1940s (Joel Nicholson, pers. comm.). Additionally, one of us (TS) has seen road-killed Franklin's Ground Squirrels south of Byemoor and near Endiang to the east. Rancher Dan Chostner (pers. comm.) has also seen Franklin's Ground Squirrels in the Endiang area.

It is interesting that residents of the Byemoor area are quite familiar with an animal of uncertain status in Alberta. Their observations point out the value of local knowledge in establishing the distribution of some species.

Northern Flying Squirrel (*Glaucomys sabrinus*)

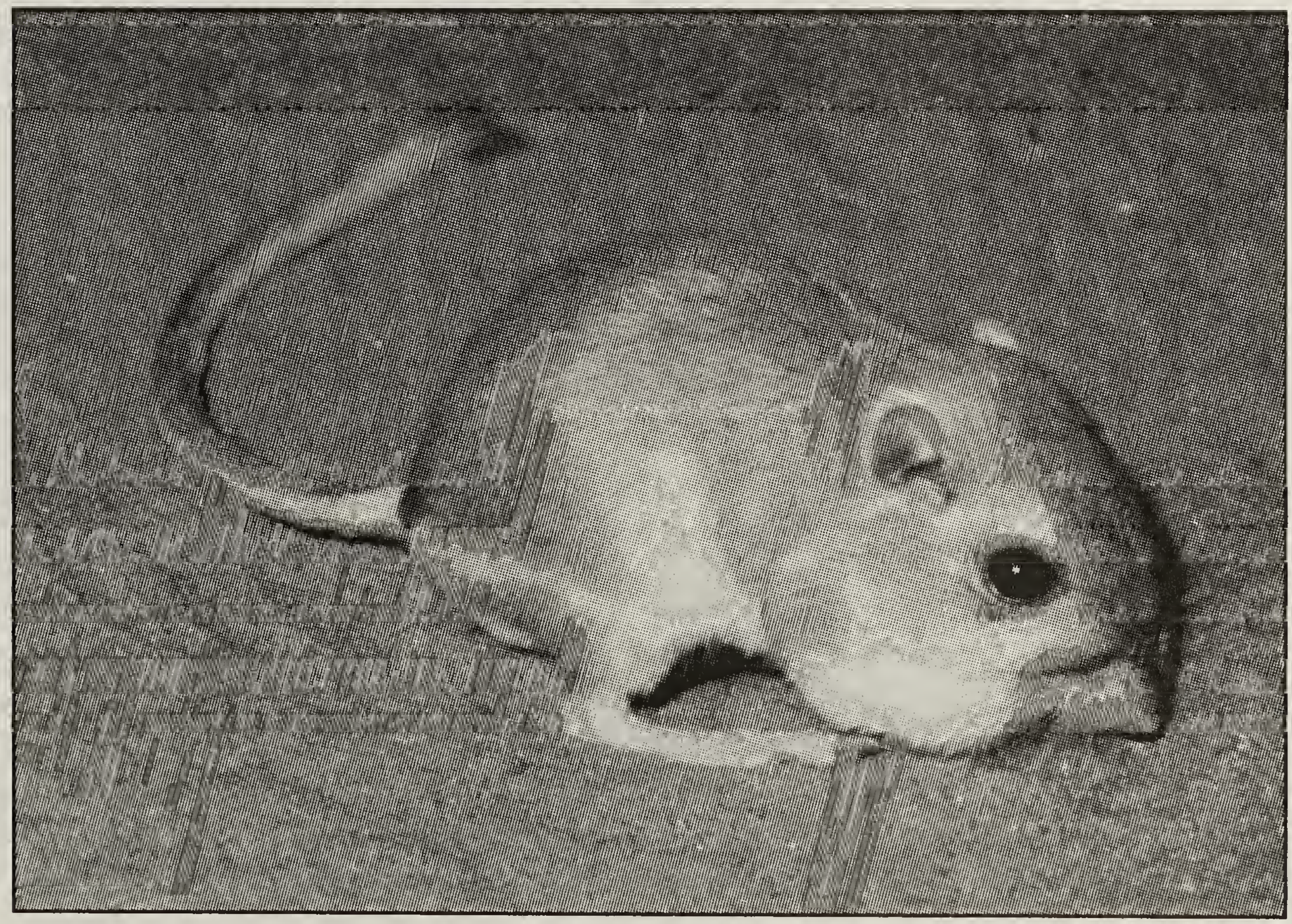
The Northern Flying Squirrel remains at Battle River Bridge (UAMZ 10001, Site 23) support an earlier owl pellet distribution record for the species in the area.[8]

Olive-backed Pocket Mouse (*Perognathus fasciatus*)

Olive-backed Pocket Mice are ranked as "Sensitive" in Alberta.[1] Occurrences are therefore of some interest. The species appears to be confined to the southeastern portion of Alberta.[2] An Olive-backed Pocket Mouse (UAMZ 10016) was recovered from a large sample of mice and voles at Middle Coulee (Site 4) southeast of Lethbridge. Smith [12] does not record this species from the region; however, he does note an owl pellet record in the region.[10] The records reported here are approximately 40 km west of previous records (Figure 3).

Ord's Kangaroo Rat (*Dipodomys ordii*)

In Alberta, Ord's Kangaroo Rat is limited to the sand hills region near the Saskatchewan border south of the Red Deer River.[4] Within that area, it appears to be relatively common.[4,6] The species is ranked as "May be at Risk."[1] Seven specimens of Ord's Kangaroo Rat were found in pellets from south of Bindloss (Site 12) on the northern edge of the Middle Sandhills. While a single sample of seven specimens is inadequate to allow conclusions to be drawn, the results suggest that Great Horned Owls might be non-trivial predators of this species.



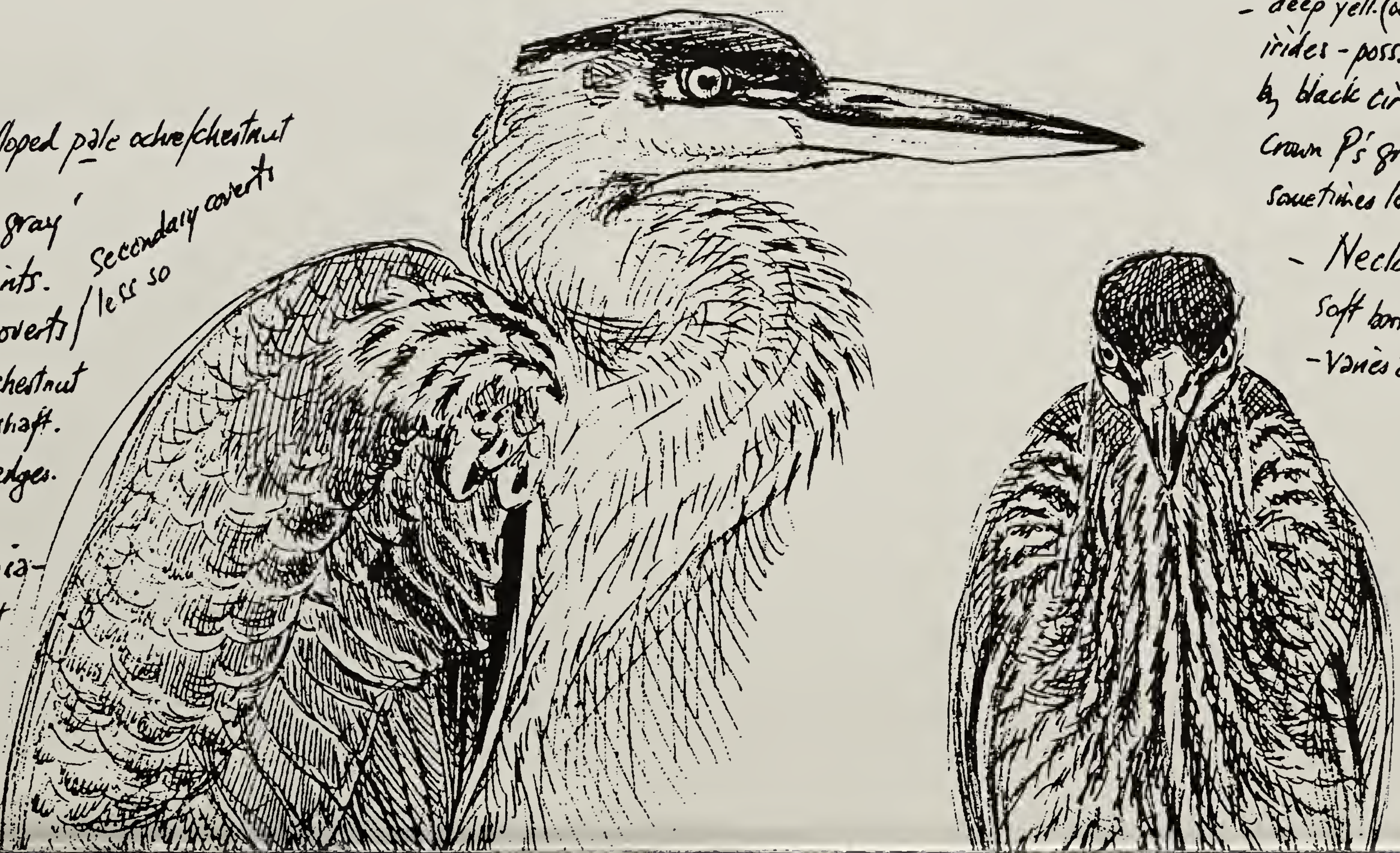
Ord's Kangaroo Rat *R.E. Gehlert*

Oct 11 '99.
MJ Dam

Imm. GBHeron

Scapts have scalloped pale ochre/chestnut washed edges;
upperparts 'herongray'
c̄ blue & sepia tints.
Grter & less wing coverts/ Secondary coverts less so
have warm ochre/chestnut
tips attentuating upshaft.
Pale(gray?) edges.

Epaulets are sepia-gray striped almost
white. Overly the
chestnut in wings



- pale blue + blue gray upper bill
- Yellow under mandible.
- Creamy white cheek.
- deep yell. (ochre tinge) irides - poss. emphasized by black circumference
Crown P's gray, but sometimes looks black.
- Neck (nape)
Soft brn gray
-Varies c̄ light

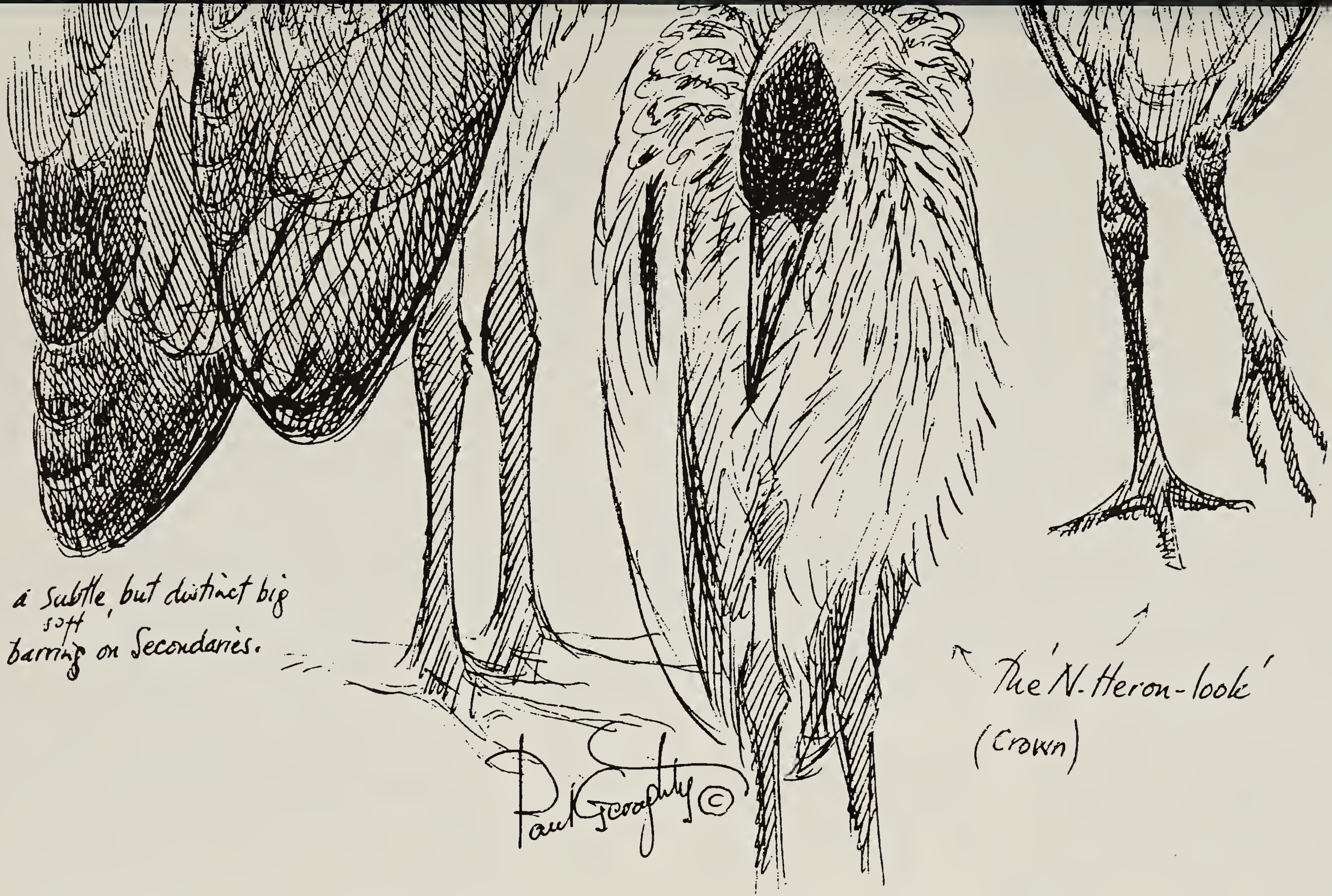
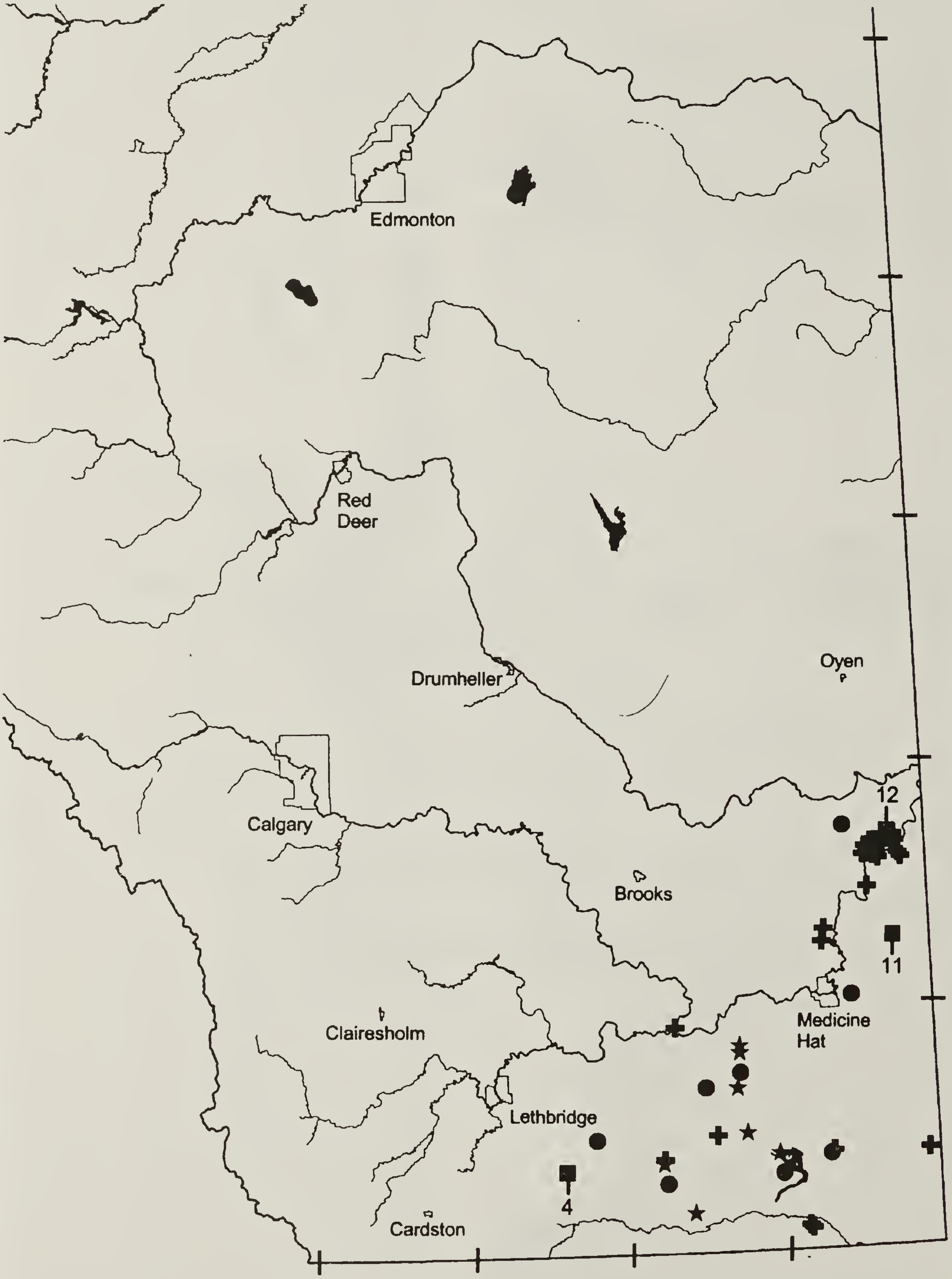

a Subtle, but distinct big soft barring on Secondaries.
The 'N. Heron-look' (Crown)
Paul Geraghty ©

Figure 3. Locations of museum and Great Horned Owl pellet specimens of Olive-backed Pocket Mice in Alberta. SQUARES = sites described in the curent study, CIRCLES = previously published GHOW pellet sites [7-11], STARS = previously published BUOW pellet sites [10, 11], CROSSES = museum specimens [2]



specimens were donated to the Provincial Museum of Alberta for ongoing research (David Gummer, pers. comm.).

Northern Pocket Gopher (*Thomomys talpoides*)

Northern Pocket Gophers are not known to occur over much of southern Alberta.[12] However, Northern Pocket Gopher populations have increased rapidly and probably have spread in that part of the province (Bryan Phillips, pers. comm.). The extent of their current distribution has not been adequately mapped. The record from northwest of Leavitt (Site 2) is approximately 20 km east of previous records.[12] However, Northern Pocket Gophers are reported as pests in alfalfa fields northwest of Warner and in the area of Taber (Jammie Meeks and Dick Layton, pers. comm.). The latter region is approximately 85 km from records to the east and 50 km east of an apparently isolated record at Lethbridge.[12] It is not known if these reports reflect long distance spread of Northern Pocket Gophers populations or if the animals existed in the area in low numbers previously and were not recorded.

Northern Grasshopper Mouse (*Onychomys leucogaster*)

Over a considerable portion of their range in central and southern Alberta, Northern Grasshopper Mice are known only from owl pellet records (Figure 4). The specimens from Linden (UAMZ 10036, Site 18) add to the previously known distribution and are 55 to 60 km from previous owl pellet records to the northeast, east, and southeast.[9,10] Pellet analyses suggest that Great Horned Owls are highly successful in capturing Northern Grasshopper Mice. The lack of Northern Grasshopper Mice in sizable pellet collections from Leavitt (Site 2), Madden (Site 16), and north of Cowley (Site 5) on western portion of the grasslands of Alberta is therefore of interest.

The occurrence of 88 Northern Grasshopper Mice in the sample from east of Stavely (Site 7) is remarkable as there are only 33 non-owl pellet specimens of Northern Grasshopper Mice from Alberta in museum collections.[2] Reasons for such a large number of the species in pellets on the apparent edge of its range are not known. The Stavely site is an area of extremely sandy soil, some of which has been planted to tame grass. Large numbers of Northern Grasshopper Mice have also been found in other owl pellet samples collected from sandy locations,[8,9] including from east of Carmenay (Site 9). However, the animals also occur frequently in pellet collections from areas that are not particularly sandy such as Middle Coulee (Site 4), Little Bow (Site 8), and southwest of Schuler (Site 11).

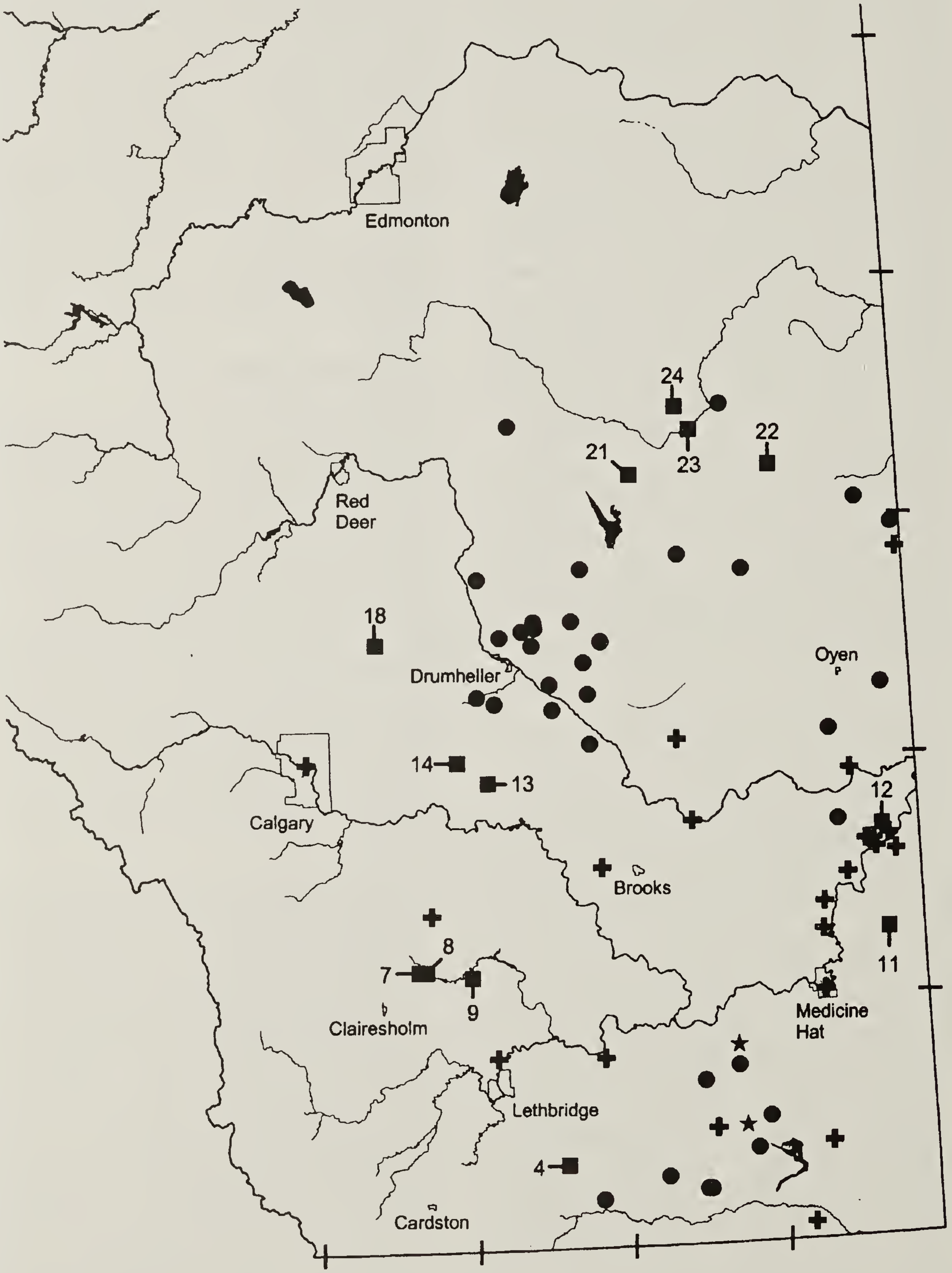
Southern Red-backed Vole (*Clethrionomys gapperi*)

The recovery of a Southern Red-backed Vole (UAMZ 10003) from a prairie location southwest of Schuler (Site 11) was unexpected as it is about 125 km south of previous Alberta records and 65 km north of records in the Cypress Hills.[12] As Southern Red-backed Voles are not thought to occur on the grasslands of Alberta, the specimen may have been transported some distance to the location by the owl. However, two Southern Red-backed Voles were captured in the Great Sand Hills of Saskatchewan to the east of this location.[3]

Long-tailed Vole (*Microtus longicaudus*)

Long-tailed Voles occur in the mountains and foothills of Alberta. A small number of scattered captures have also been made on the grasslands along the Milk River and south of the Cypress Hills.[12] Separation of Long-tailed Voles and the common Meadow Vole solely on the basis of teeth is not absolutely certain as there is overlap in the dental characteristics.[13] Long-tailed Voles were provisionally identified from pellets from northwest of Leavitt (UAMZ 10012, Site 2) and near Madden (UAMZ 10007, Site 16) on the basis of dental characters. The specimen from Madden is approximately 64 km northeast of the nearest record mapped by Smith.[12] Given the

Figure 4. Locations of museum and Great Horned Owl pellet specimens of Northern Grasshopper Mice in Alberta. SQUARES = sites described in the curent study, CIRCLES = previously published GHOW pellet sites [7-11], STARS = previously published BUOW pellet sites [10, 11], CROSSES = museum specimens [2]



sporadic nature of occurrence of Long-tailed Voles outside the mountains,[12] new distribution records would not be unexpected. However, the uncertainty of identification using teeth and possibility of long-distance transport by the owls necessitates the gathering of additional evidence to establish the occurrence of the species at the locations reported here.

Sagebrush Vole (*Lemmiscus curtatus*)

Sagebrush Voles occur widely on the grasslands of Alberta (Figure 5) and are abundant in many owl pellet collections (Table 1).[8,9,10,11] Specimens from Leavitt (UAMZ 10014, Site 2) and Mountain View (UAMZ 10008, Site 1) are approximately 20 km west of the nearest previous record.[12] The six specimens from northeast of Coronation (UAMZ 10028, Site 22) are approximately 48 km north of the nearest previously described location for the species.[8] Of interest is that Prairie Voles also occur at the Coronation site (Table 1); the co-occurrence of Sagebrush Voles and Prairie Voles in owl pellets has not been previously reported in Alberta despite an examination of a number of collections from sites with open parkland similar to that of the Coronation site.

Prairie Vole (*Microtus ochrogaster*)

Prairie Voles are ranked as "Undetermined" in Alberta.[1] and are one of the least frequently captured small mammals in the province.[2] While Prairie Voles have been found in some samples of owl pellets in the past,[8,9] some of the records reported here are of larger numbers of individuals. We recovered Prairie Voles south of Cochrane (UAMZ 100010, Site 15), northwest of Madden (UAMZ 100017, Site 16), west of Three Hills (UAMZ 10005, Site 19), near Castor (UAMZ 100021,Site 21), northeast of Coronation (UAMZ 10031, Site 22) and near Duhamel (UAMZ 10033, Site 25). Some of these locations are new marginal records for the species (Figure 6). Of note, the record at Cochrane (Site 15) is approximately 67 km south of a previously mapped record [2,12] though the specimens we found at Madden (Site 16) are between the Cochrane location and the previous record. The records at Castor and Coronation are approximately 60 km southwest and 35 km southeast, respectively, of a previous record.[12]

The occurrence of 23 individuals in the Madden sample (Table 1) and the number of new location records suggests that further examination of owl pellets will produce information of value in helping to determine the distribution and status of Prairie Voles in Alberta.

Summary

In this study, new distribution records of 11 species of Alberta mammals and observations of a twelfth are reported. Several of those species have been identified as being of conservation concern.[1] These, and previous results,[8,9,10,11] suggest that analyses of additional pellets, particularly from areas not previously sampled, will continue to provide new information on the occurrence of small mammal species in Alberta

Acknowledgements

Many the results described here were obtained through research contracts with Alberta Sustainable Resource Development to TS.[7] Gordon Court supervised the contracts and actively encouraged the research. His interest and support are gratefully acknowledged. Sorting of some owl pellets was done by participants at the Dinosaur Country Science Camp under supervision of RD. The enthusiasm of the camp counsellors Matt Shannon and Stu Crawford and camp participants has been an important dimension of the work. Wayne Roberts (University of Alberta Museum of Zoology) generously provided ready access to the collections in his care so that identifications of the mammals could be confirmed. Wayne further accepted voucher specimens. We extend our thanks to Dan Chostner, Dick Layton (Municipal District

Figure 5. Locations of museum and Great Horned Owl pellet specimens of Sagebrush Vole in Alberta. SQUARES = sites described in the curent study, CIRCLES = previously published GHOW pellet sites [7-11], STARS = previously published BUOW pellet sites [10, 11], CROSSES = museum specimens [2]

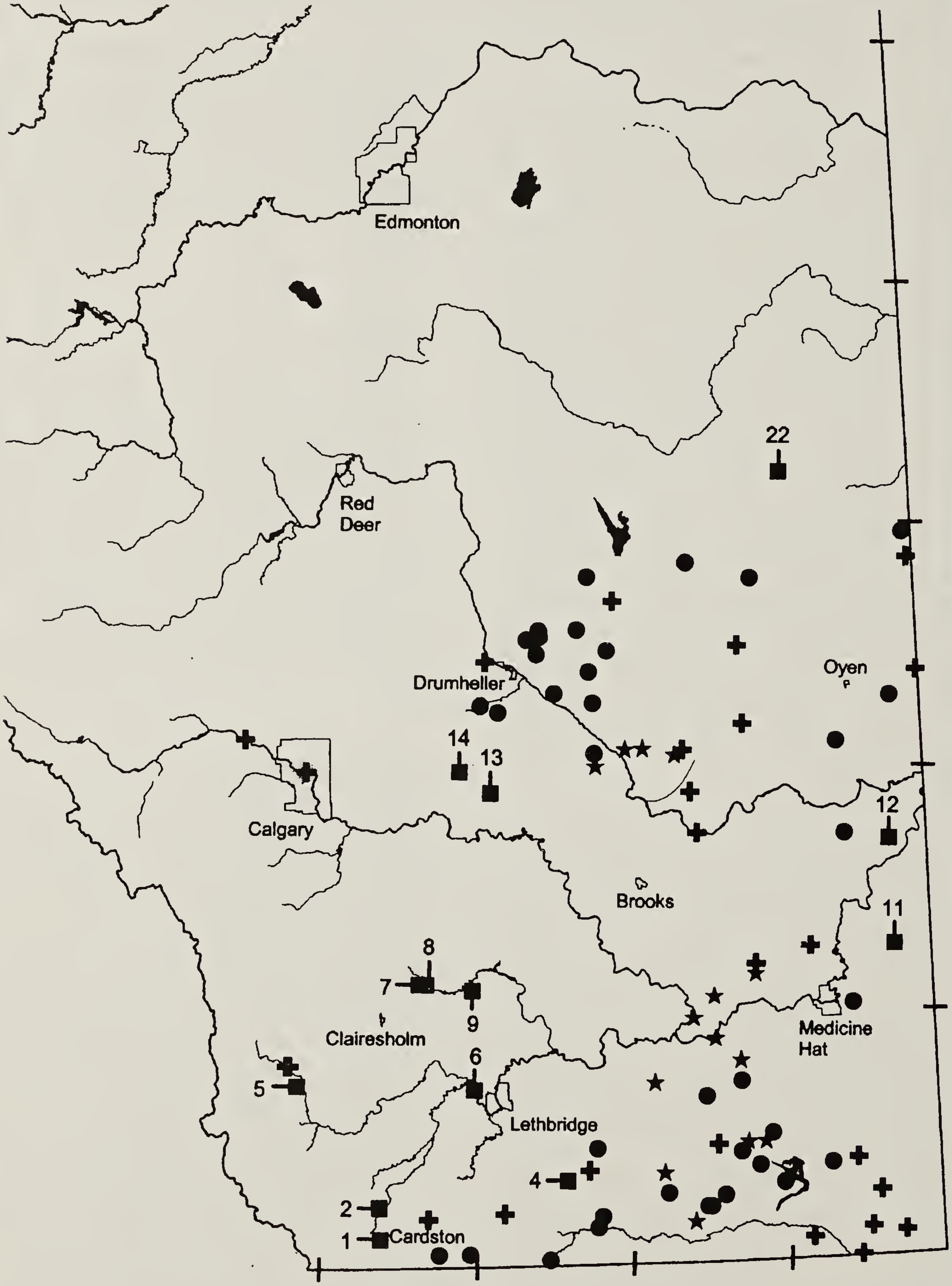
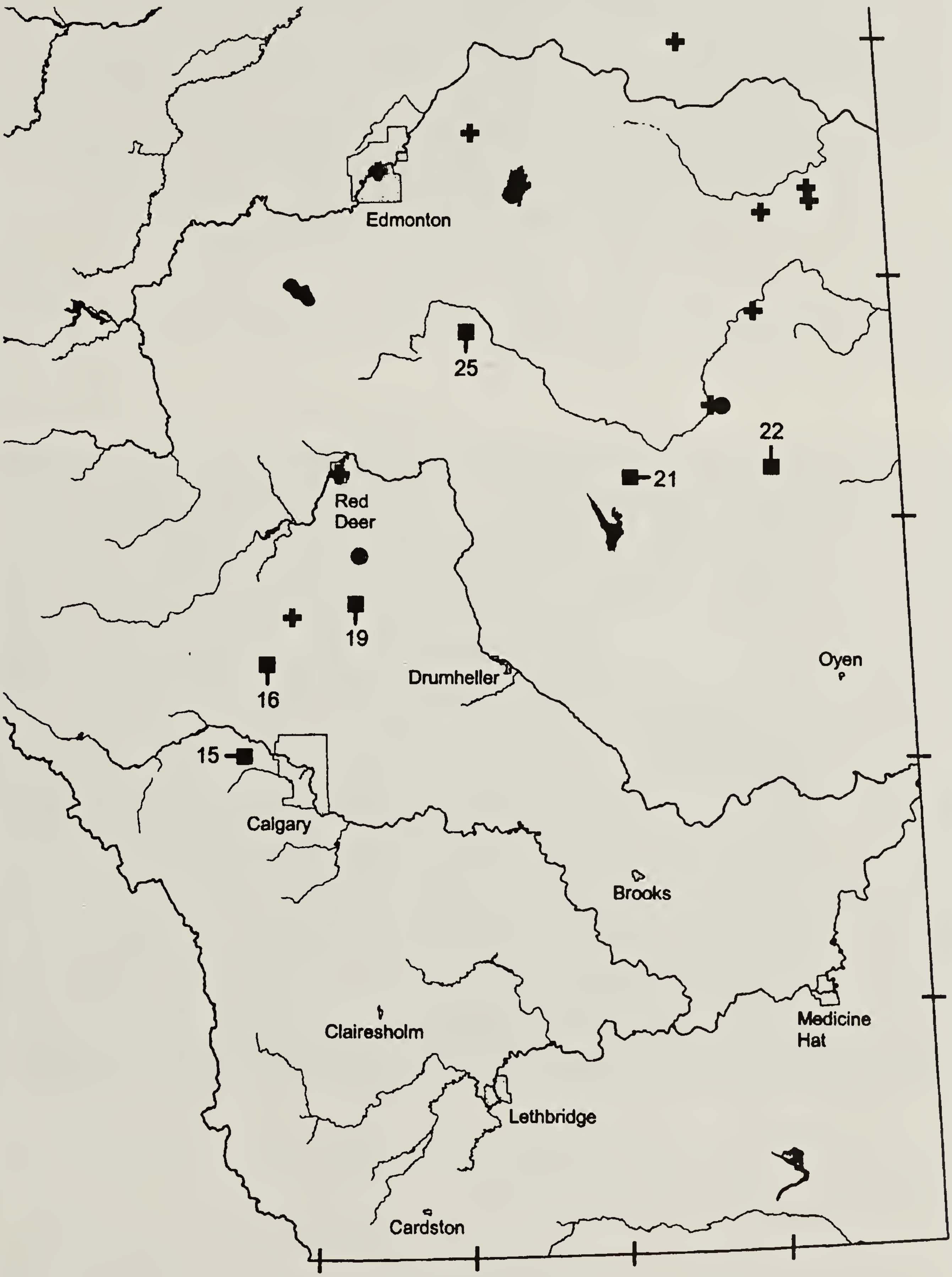


Figure 6. Locations of museum and Great Horned Owl pellet specimens of Prairie Vole in Alberta. SQUARES = sites described in the curent study, CIRCLES = previously published GHOW pellet sites [7-11], STARS = previously published BUOW pellet sites [10, 11], CROSSES = museum specimens [2]



of Taber), Jamie Meeks (County of Warner), Joel Nicholson (Alberta Sustainable Resource Development, Medicine Hat), and Bryan Phillips (Municipal District of Cardston) for sharing their personal observations and knowledge. The anonymous reviewer provided insightful comments and alerted us to the published occurrence of red-backed voles in the Great Sand Hills of Saskatchewan. Finally, special thanks are due to the landowners who gave permission to collect pellets on their land.

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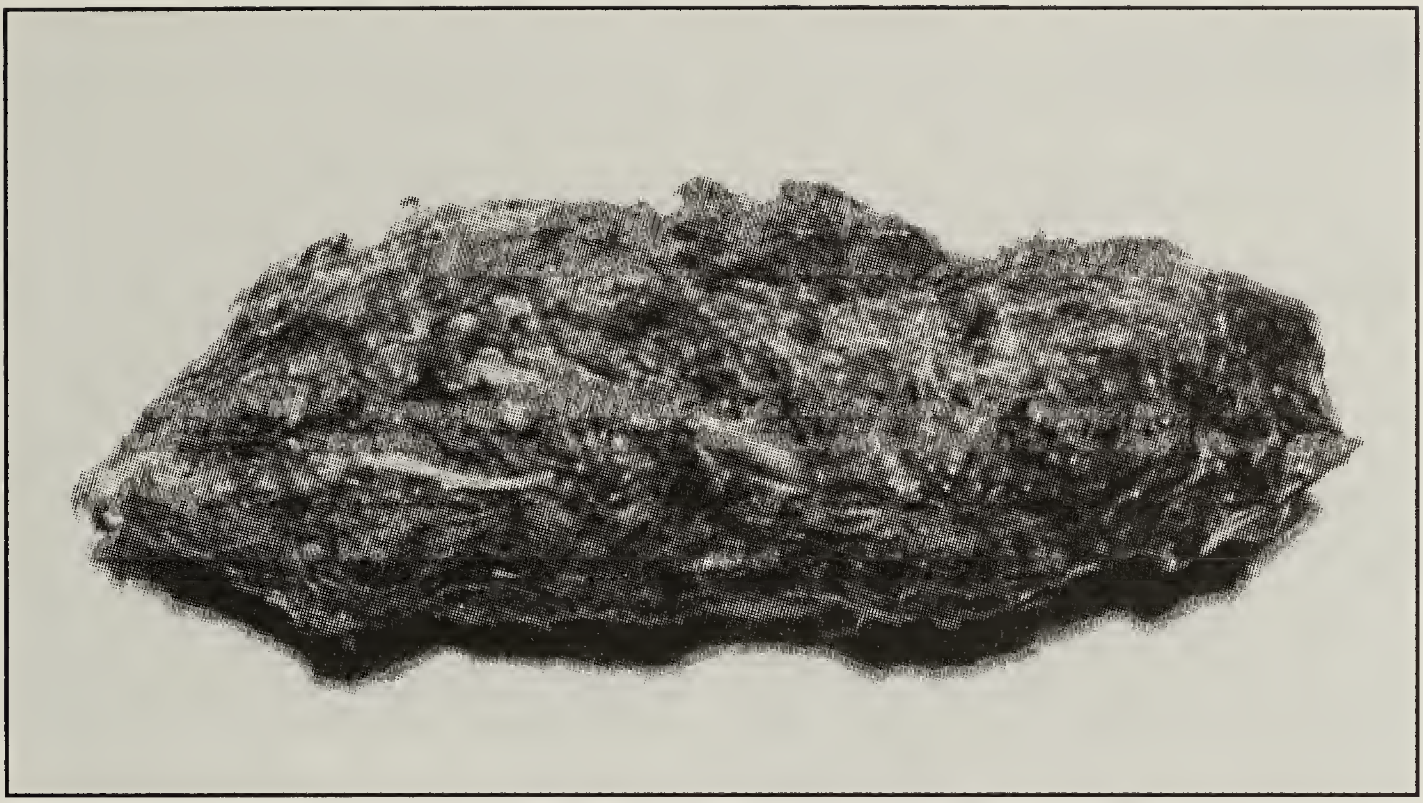
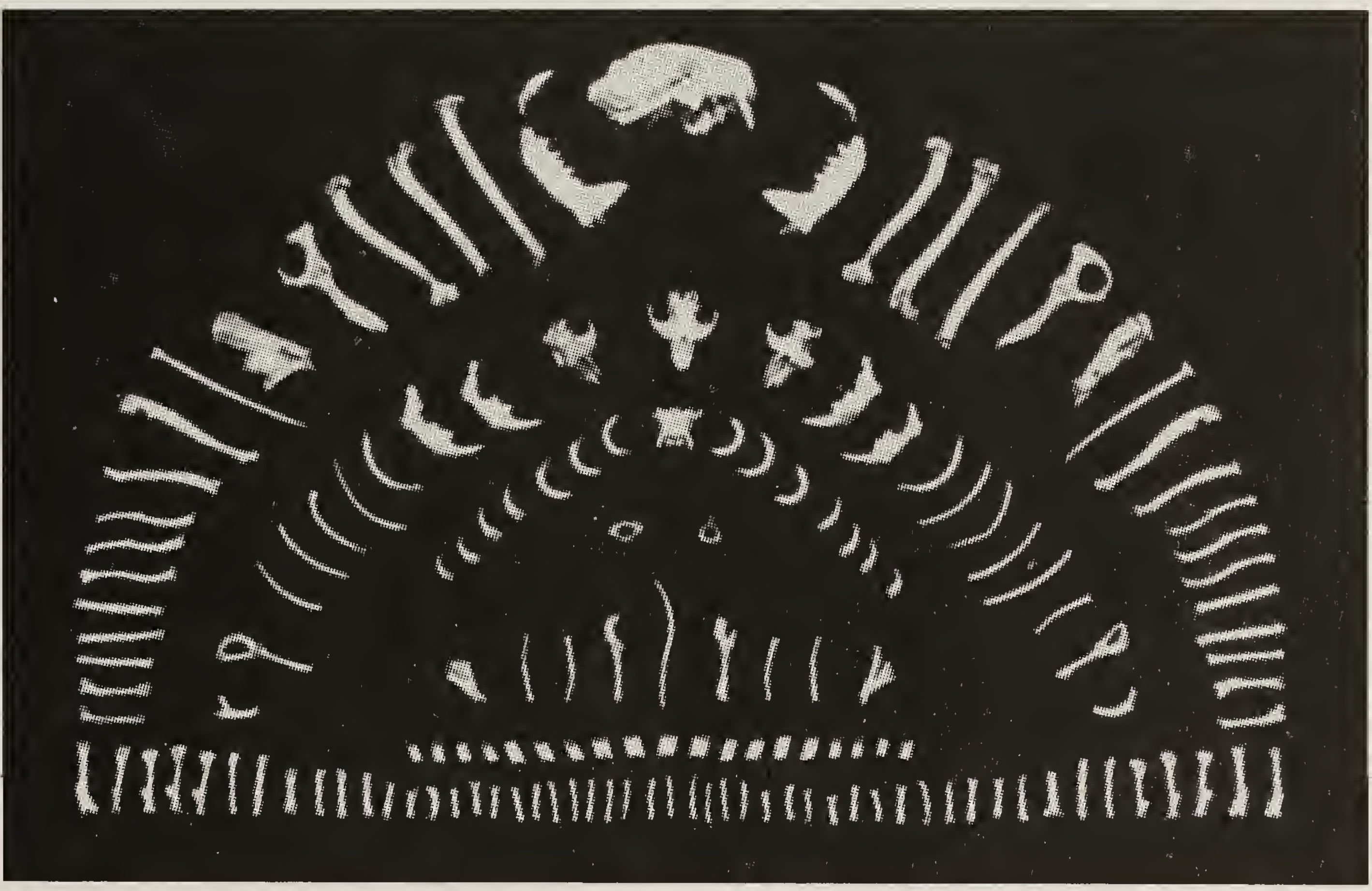


Snowy Owl pellet *R. E. Gehlert*



*The contents of the Snowy Owl pellet shown above, which included one short-tailed weasel and a minimum of four meadow voles (*Microtus sp.*)* *R. E. Gehlert*

A SUMMARY OF SASKATCHEWAN BEETLES

RONALD R. HOOPER, Box 757, Fort Qu'Appelle, SK S0G 1S0

Common Red Lady Beetle, **Coccinella transversoguttata** *R. Hooper*

When it comes to biodiversity, there are more species of beetles in the world than any other living creatures. Someone has aptly remarked that the Creator must have had a great fondness for beetles for He made such a variety of species. Over one third of a million species have been named worldwide, with many new ones being named every year. (As far as numbers of individuals go, however, ants would have them beat).

Beetles can be found in nearly every habitat imaginable. The more diverse habitats a beetle collector looks in, the more species he is going to find. They are on the ground, under the ground, on roots, on (or in) plant stems (or trunks), under bark, on twigs and leaves, and in tree-tops. Different kinds are in muddy water, calm water, running water, and swiftly flowing water. Special species feed on special kinds of flowering plants and on fungi. They are in nests, dung, and carrion. They are on hill-tops, in sand, and in mud. They are in barns, granaries, houses, and cellars. Our largest species of beetle is the Giant Water-scavenger Beetle (*Hydrophilus triangularis*). It is 39 mm from the front of the head to the tip of the elytra. Our smallest beetles are some of the feather-winged beetles, which are barely over one half a millimetre long.

The nucleus of the provincial beetle collection in the Royal Saskatchewan Museum (RSM) in Regina, Saskatchewan is the Cliff Shaw collection that was donated to the museum after he passed away in 1959. It contains 472 Saskatchewan species collected mainly at Yorkton, Madge Lake, and Waskesiu between 1937 and 1951. Over the years a collection of Saskatchewan beetles was built up at the Department of Agriculture Research Station in Saskatoon. By the mid-1960s this collection contained 835 species.

I started collecting beetles near Somme, SK in 1953. By 1969 I had 857 Saskatchewan species in the collection, and by 1980, 1,161 Saskatchewan species. These were mostly from Somme, Punnichy, and Fort Qu'Appelle. I donated my private collection to the RSM and it was incorporated into the museum's collection. The museum collection is housed in 100 glass-topped drawers in 5 cabinets. The majority of the collection has been identified by specialists in Ottawa, Edmonton, St. John's, and New York.

Long-horned Beetles on rose *R. Hooper*
upper - **Cortodera longicornis,**
lower - **Cyrtophorus verrucosus**

Beetles continued to be collected for the museum on many field trips throughout the province from 1964 on and other additional specimens are added annually. As of June of 2001, the RSM beetle collection contained 28,316 specimens of 1,784 species. The total for the province (counting known records in other collections and unidentified species) is 2210.

The museum has approximately 140 unidentified species in its collection. Some of these are species that have not yet been named. These wait for a specialist to revise their families or genera, and give them names. In 1995, Dr. A. Smetana published a book on the Philonthini group of rove beetles in North America. In this book, he named five new species that occur in Saskatchewan. In 1999, Dr. Y. Bousquet and S. Laplante wrote a book on the Histerid Beetles of Quebec. In it, they named two Quebec species that range west to Saskatchewan, giving us names for two more of our species.

The total number of beetle species recorded for Canada in 1991 was 7,447 species, with 7,279 in the 81 families that occur in Saskatchewan.[1] The current list of 2,210 species for Saskatchewan is far from being complete; it is expected that the total for Saskatchewan could be over 5,000 species, so we have a long way to go yet!

Following is a chart of the 81 known Saskatchewan beetle families. In most cases, the numbers referred to are up to June 2001. The first column shows the total number of Saskatchewan species in each family and includes species in the RSM collection and known records in other collections. The second column gives the number of Saskatchewan species in the RSM and the third, the number of specimens in the RSM. The fourth column tells the number of species listed for Canada from each family, based on Bousquet (1991).

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May Beetle, **Phyllophaga anxia**
R. Hooper

Common name	Scientific name	SK sp.	RSM sp.	RSM Nos.	CA sp.
1. Trachypachid Beetles	Trachypachidae	1	1	2	2
2. Ground and Tiger Beetles	Carabidae	322	307	7,438	937
3. Crawling Water Beetles	Haliplidae	11	9	313	37
4. Predaceous Diving Beetles	Dytiscidae	132	114	2,842	262
5. Whirligig Beetles	Gyrinidae	26	20	769	36
6. Minute Moss Beetles	Hydraenidae	5	4	44	27
7. Feather-winged Beetles	Ptiliidae	6	6	29	29
8. Small Scavenger Beetles	Leiodidae	38	15	129	123
9. Antlike Stone Beetles	Scydmaenidae	1	0	0	46
10.Micropeplid Beetles	Micropeplidae	3	2	3	10
11.Carrion Beetles	Silphidae	18	18	415	25
12.Rove beetles	Staphylinidae	243	187	1,550	1,084
13.Shining Fungus Beetles	Scaphidiidae	4	4	23	17
14.Short-winged Mold Beetles	Pselaphidae	9	1	1	84
15.Water Scavenger Beetles	Hydrophilidae	60	51	2,289	149
16.Hister Beetles	Histeridae	38	28	229	118
17.Plate-thigh Beetles	Eucinetidae	3	2	7	7
18.Minute Beetles	Clambidae	2	2	4	7
19.Marsh Beetles	Scirtidae	3	1	119	26
20.Stag Beetles	Lucanidae	2	1	14	14
21.Scarab Beetles	Scarabaeidae	75	59	1,421	248
22.Pill Beetles	Byrrhidae	12	12	223	26
23.Metallic Wood-boring Beetles	Buprestidae	48	34	324	152
24.Variegated Mud-loving Beetles	Heteroceridae	14	3	656	25
25.Longtoed Water Beetles	Dryopidae	1	1	3	6
26.Riffle Beetles	Elmidae	4	0	0	32
27.Click Beetles	Elateridae	102	76	809	367
28.Throscid Beetles	Throscidae	1	1	1	9
29.False Click Beetles	Eucnemidae	4	3	3	32
30.Net-winged Beetles	Lycidae	5	3	20	29
31.Fireflies	Lampyridae	9	9	189	29
32.Soldier Beetles	Cantharidae	15	14	300	123
33.Carpet and Skin Beetles	Dermestidae	20	18	208	46
34.Bostrichid Powder-post Beetles	Bostrichidae	4	2	2	18
35.Deathwatch Beetles	Anobiidae	18	18	48	79
36.Spider Beetles	Ptinidae	8	3	28	16
37.Bark-gnawing Beetles	Trogossitidae	6	6	37	22
38.Checkered Beetles	Cleridae	13	10	124	50
39.Soft-winged Flower Beetles	Melyridae	14	14	180	49
40.Dry-fungus Beetles	Sphindidae	1	1	1	5
41.Sap Beetles	Nitidulidae	37	34	264	101
42.Root-eating Beetles	Rhizophagidae	5	2	5	24
43.Flat Bark Beetles	Cucujidae	12	9	50	31
44.Silken Fungus Beetles	Cryptophagidae	24	27	157	66
45.Lizard Beetles	Languriidae	1	0	0	7
46.Pleasing Fungus Beetles	Erotylidae	4	4	83	20
47.Shining Flower Beetles	Phalacridae	14	14	123	5

48.Cerylonid Beetles	Cerylonidae	2	2	6	7
49.Minute Fungus Beetles	Corylophidae	3	2	9	11
50.Lady Beetles	Coccinellidae	75	51	1,343	162
51.Handsome Fungus Beetles	Endomychidae	2	2	21	15
52.Minute Brown Scavenger Beetl	Lathridiidae	15	15	156	55
53.Fruitworm Beetles	Byturidae	1	1	1	1
54.Hairy Fungus Beetles	Mycetophagidae	9	8	33	15
55.Tetratomid Beetles	Tetratomidae	1	0	0	9
56.Minute Treef-ungus Beetles	Ciidae	6	3	48	29
57.False Darkling Beetles	Melandryidae	12	12	22	55
58.Tumbling Flower Beetles	Mordellidae	31	27	137	70
59.Wedge-shaped Beetles	Rhipiphoridae	2	0	0	10
60.Cylindrical Bark Beetles	Colydiidae	1	0	0	21
61.Darkling Beetles	Tenebrionidae	30	27	490	135
62.Lagriid Beetles	Lagriidae	2	2	5	6
63.False Long-horned Beetles	Cephaloidae	3	3	4	9
64.Blister Beetles	Meloidae	25	22	486	49
65.False Blister Beetles	Oedemeridae	3	3	11	13
66.Borid Beetles	Boridae	2	2	4	2
67.Pythid Beetles	Pythidae	4	4	9	6
68.Fire-colored Beetles	Pyrochroidae	2	2	4	12
69.Narrow-waisted Bark Beetles	Salpingidae	1	1	2	10
70.Antlike Flower Beetles	Anthicidae	25	21	254	55
71.Pedilid Beetles	Pedilidae	3	3	30	19
72.Scraptiid Beetles	Scraptiidae	5	5	30	21
73.Longhorned Beetles	Cerambycidae	77	71	776	354
74.Seed Beetles	Bruchidae	11	5	16	19
75.Leaf Beetles	Chrysomelidae	209	150	1,948	569
76.Fungus Weevils	Anthribidae	6	4	6	18
77.Leaf-rolling Weevils	Attelabidae	1	1	8	4
78.Leaf and Bud Weevils	Rhynchitidae	6	5	54	13
79.Pear-shaped Weevils	Apionidae	18	11	27	35
80.Snout Beetles(Weevils)	Curculionidae	176	145	776	609
81.Bark Beetles	Scolytidae	43	24	121	204
TOTALS		2,210	1,784	28,316	7,279

* * *

"From the sap beetle pollinators of western spicebush to the specialized scarab beetles that enter and pollinate the flowers of the giant Amazonian waterlilies, beetles are the customers and pollen vectors of choice for thousands of flowering plants on most continents....Approximately 30 families of beetles are today engaged in the pollination trade, often acting as what has been termed 'mess-and-soil pollinators.' While the label is not terribly flattering to this ancient lineage of inordinately successful insects, it does indicate their mode of entry and gustatory pursuits.

- Buchmann and Nabhan, *The Forgotten Pollinators*, p.95

NOTES AND LETTERS

MIGRATING WINTER WRENS – LOOK IN THE WOODPILE

On October 9, 1999, a Winter Wren was in my yard in Tyvan, SK. I heard it, then saw it as it skulked within a cotoneaster hedge on the edge of my garden. Ten minutes later, as I searched the area, it flushed silently from a nearby gooseberry bush, then flew a short distance to an adjacent shelter belt and disappeared into a brush pile. After this, I heard it call briefly as it moved quickly through the dense understory of the shelterbelt. I was unable to find it again.

During mid- to late September and throughout October, I search for this elusive bird in wood and brush piles, which seem to be choice foraging sites during migration. In spring and fall, I have found Winter Wrens foraging within several large wood piles at the Little Red River Park near Prince Albert. Also, on September 18, 1992, an unusually early date, I found a migratory bird exploring Carman Dodge's wood pile near St. Louis, Saskatchewan.

These birds are hardy. I have seen them as late as September 29 at a regular breeding site along the Tree Beard Nature Trail in Prince Albert National Park. I saw one in a brush pile near Emma Lake, just after an October 19 snowfall when the temperature was -12 C. On October 24, 1981 in Regina, when there was snow on the ground and temperatures of -5 C, I saw my first migrant Winter Wren, an individual first discovered by Paule Hjertaas.

In summer, Winter Wrens are resident within many areas of Saskatchewan's mixedwood forests including Christopher Lake, Emma Lake, Candle Lake, Prince Albert National Park, and along Highway 121 from the A.E. Campbell dam at the outlet of Tobin Lake, to Cumberland House. I have also found them singing on territory within the Nisbet Forest, along the North Saskatchewan River across from the city of Prince Albert. Robert Kreba (pers. comm.) had several recent summer sightings along the Red Squirrel Trail in Duck Mountain Provincial Park. Kreba also made a tape recording of a bird singing on July 1996, along the Valley of the Beavers Trail in the Main Block of Cypress Hills Provincial Park. Burke Korol (pers. comm.) has an early April 1988 record of a singing Winter Wren in the Cypress Hills.

Winter Wrens, noted for the virtuosity of their prolonged, high-pitched, vibrant songs, also have surprisingly loud single or doubled scold notes, very different from those of House Wrens. Each single syllable *sked*! or *chet*! sounds very similar to the alarm or scolding call of the Song or Swamp Sparrow.

Winter Wrens are not uncommon within their breeding haunts. However, they are rare and elusive migrants. Knowing their habitat preferences and calls will enhance your opportunity to find them both within their breeding areas and during migration.

- *Bob Luterbach*, 2644 B, Shooter Drive, Regina, SK S4V 1E1.

PINK TREE SWALLOW EGGS

On June 2, 2002, I found that Tree Swallows were just getting started with egg laying on the Rube Johnston Bluebird Trail, south of Vegreville, Alberta. In a normal year, their eggs are white, with pink eggs being a rarity. On this day I found 44 light pink eggs and only one white egg in 26 boxes, on a 69-box trail. Egg numbers per box ranged from one to five.

My thoughts were that the food available for the birds must be different from the usual, due to the cool and critically dry start to the season. Normally, there would be wet fields and sloughs all along the trail and no lack of insects for the swallows to choose from. Not this year. The following day, on a new and isolated section of the trail, where there is a creek with ponds of water, I found 18 white Tree Swallow eggs in three boxes.

When I sent out a message by e-mail, asking what may be causing the pink eggs, I did get a few replies from other people who monitor nest boxes. Myrna Pearman, biologist at The Ellis Bird Farm in Lacombe, Alberta explained: "In my experience, all Tree Swallow eggs have a pinkish colour when they are first laid, and then become whiter as the embryo develops. Usually, by the time the eggs are ready to hatch, they are almost a 'charcoal' white". David W. Winkler of Cornell University in Ithaca, New York, who researches Tree Swallows, agreed with Myrna's observations, adding: "We think the pink colour is from transmitted light through the egg and yolk, and that the eggs get opaque when the embryo begins developing the chorio-allantoic membranes around the inside of the egg, blocking out the light". David further asked if the pink eggs hatched properly.

To follow-up on the question of egg viability, I checked for unhatched eggs. In late July, after the Tree Swallows had finished nesting, I found that two nests, each with six eggs that were still pink, had not been successful. In one of the boxes, the parents had re-nested and laid four eggs, all of which hatched but only two of the young had fledged. In the 67 remaining Tree Swallow boxes there were only eight more unhatched eggs, some pink and some white. Even with the cold weather and slow start to the season followed by extremely dry weather, most of the nests had been successful. Interestingly, the five boxes with Mountain Bluebirds did not appear to be affected by the drought. Four of the five Mountain Bluebird boxes had two broods and all eggs and nestlings looked normal.

Tree Swallow ***John Lane***

As far as whether it was just newly hatched eggs that I found with a light pink colour, all I can offer is that all pink egg clutches ranged from one to eight in number. I found eight light pink eggs in one late-starting Tree Swallow nest. And then, just to confuse the issue, I found a nest nearby with six white eggs. Unfortunately, I was not able to monitor often enough to see if these pink eggs eventually turned white before hatching. In the previous year on this trail, I saw only one or two pink eggs.

Another thing that I found this year that I had not seen in previous years, was empty snail shells in two of the Tree Swallow boxes. There were four shells in one box, two in the other. David Winkler explained that they see empty snail shells in the nest quite often. The birds feed their nestlings shells, an excellent source of calcium which insects as food do not provide. He also said that once in a while a shell doesn't make it down the nestling's gullet and is then found in the nest after the birds have fledged. If any of the readers have made similar observations, please feel free to contact me.

- *Robert B. Hughes*, 5510 61 Street,
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A TALE OF TWO SWAMP PUMPS

My wife, Carolyn, and I love to go for a stroll in Wascana Park in the Natural Area south of the Regina Hill or Mountain (depending on your point of view). On the evening of May 21, 2001, we heard an American Bittern doing his booming pumping call in the area of the second lagoon along the Wascana Nature Trail. Thinking this might be an opportunity to see a bittern calling at close range we approached the area cautiously and were rewarded by a good view of a bittern moving around in a stand of dead bulrushes (*Scirpus sp.*), left over from the previous year's growth. The bird was pumping occasionally, then stumbling a few feet somewhat awkwardly through and over the bulrushes. He would move, then call once or twice, then move again. This bittern, we noticed immediately, looked different than any bittern we had seen before. On each shoulder and over his upper back area, he had a large white patch of fluffy feathers, which at first glance, made him look like some unknown beast but when viewed through binoculars were clearly epaulets that comprised part of his costume.

Before we had a chance to really digest what was happening here, a second bittern suddenly appeared. This bird did not have the white patches but appeared all fluffed up like a broody hen with the feathers on its head and neck fully erected and wings partly extended. This second bird charged the first, covering 5 or 6 feet in one or two hops. The displaying male didn't retreat but instead turned quickly and appeared to jump on the charging bird. Much wallowing and commotion ensued in the rushes. We could not see what was going on because our view was completely obscured by the marsh vegetation. We guessed we were witnessing copulation. Within about thirty seconds the male, his white shoulder patches still very visible rose up out of the vegetation and stalked off across the bulrushes for approximately three meters where he stopped in a small relatively open area, gave his pumping call twice, then hunkered down and sat there silently.

For a while we were unable to see the second bird (presumably the female). But eventually I was able to make her out in the same area as the struggle had taken place. We could see her pulling pieces of vegetation in toward her as though she was adding material or re-arranging material in a nest. We concluded that we had had the rare opportunity to witness bitterns mating at a nest or potential nest site. The picture of the male with his white shoulder patches was worth the price of admission alone.

The Birder's Handbook states that the male American Bittern is known to display these white fluffy feathers on its back while uttering its booming call and displaying for the female.[2] Gibbs et al. in quoting Brewster (1911) indicates that, in ground encounters between territorial male American Bitterns, they approach each other in a defensive crouch while showing white plumes between their shoulders.[3] Brewster quoted by Bent, describes the white feather patches from the side view as appearing to be a band of white as broad as one's hand extending between the shoulders across the back.[1] This description generally fit our own observation. We also saw the male's adornments from the rear very briefly and they appeared to us as two patches on the top of the shoulders. Brewster described them appearing almost like two separate wings, close to the size of a pigeon's wings, standing out from above the shoulders. These references also describe how repeated aerial chases often ensue after ground interactions involving two or three males, or a male and female bittern, where the white shoulder feathers are prominently displayed on the males. We did not observe an aerial display on this or any other occasion.

Bitterns are normally very shy and either remain motionless, trusting to their cryptic colouration and silhouette outline to hide in the reeds and rushes, or they flush at considerable distance. These birds in Wascana Waterfowl Park seemed totally oblivious to our presence despite the fact that we were in plain view, although quiet and slow moving. Eventually we slowly moved off and continued our walk around the nature trail. Occasionally we could hear the swamp pump calling out his message that this was his area of marsh and no one should forget it. When we left the area at dark he was still calling. We returned to the lagoon area several times later in the spring but never saw or heard the bitterns again. Perhaps they had been chased away by too many other visitors or maybe they just reverted back to the more typical secretive ways of bitterns and we missed them.

1. BENT, Arthur Cleveland. 1963 (1926). Life Histories of North American Marsh Birds. Dover Publications Inc. New York.

2. EHRLICH, Paul R., David S. DOBKIN and Darryl WHEYE. 1988. The Birder's Handbook, A Field Guide to the Natural History of North American Birds. p. 32.

3. GIBBS, J.P., S. MELVIN and F.A. REID. 1992. American Bittern. In The Birds of North America, No 18. (Poole, P. Stettenheim, and G. Gill, Eds.). Philadelphia: the Academy of Natural Sciences; Washington, DC: The American Ornithologists' Union

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FLIGHTLESS GREAT HORNED OWL SURVIVES THREE MONTHS

A pair of Great Horned Owls spent the summer in my farm shelterbelt near Richlea, Saskatchewan. On July 15, I noted that the larger of the two owls was unable to fly and it appeared that she had a broken wing. Almost every day I would see her walking and hopping along the ground. Although there were mice in the yard, I doubted that she could catch them on foot and I didn't expect her to survive.

Over the next two months, her wing healed so that she could make brief flaps about a metre above the ground and get up onto a cultivator or onto a bench. She still could not fly well enough to gain elevation to any tree branch. She would sit on her perch all day long.

My sister, Mrs. Katherine Rodin, was concerned about the owl and phoned Stuart Houston, who then contacted me. We agreed that the owl was unlikely to survive the winter. I didn't wish to shoot her to put her out of her misery, since she seemed to be eating something, somehow. Nor did I wish to kill her merely to confirm her sex, learn the extent of her injuries, and her state of nutrition. I decided to just watch her and allow nature's experiment to continue.

She finally died on the first of November and her body was brought to the Canadian Cooperative Wildlife Health Centre at the Veterinary College at the University of Saskatchewan for examination. The cause of death was starvation. The owl was

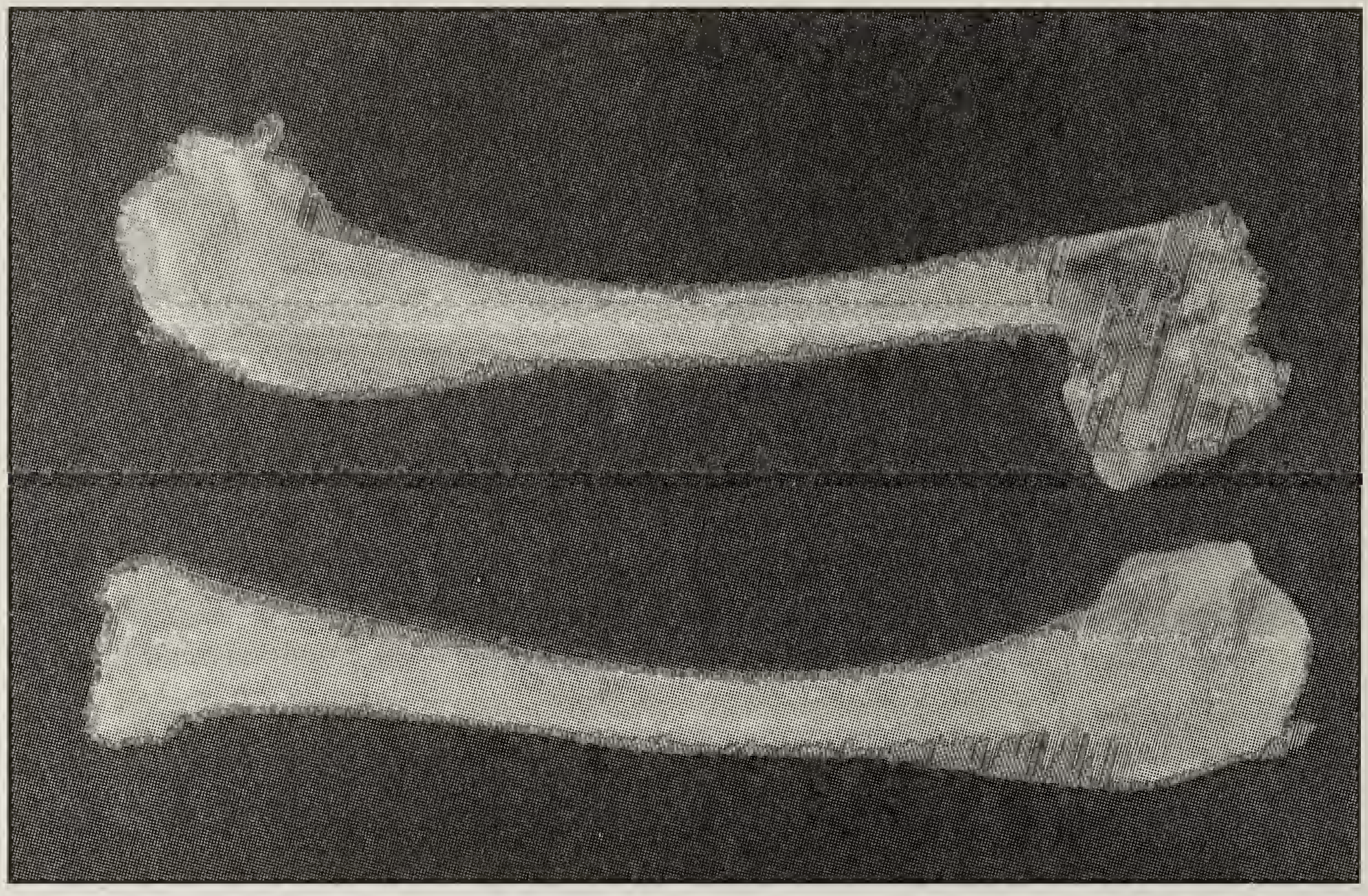


Figure 1. Wing bones from the Great Horned Owl. Upper: the fractured left humerus with the right end (that articulates as the elbow) broken off and reattached to the side of the bone. Lower: the undamaged right humerus for comparison (but in reverse orientation).

severely emaciated, weighed only 850 g and had no fat and virtually no pectoral muscle. There was a partially healed fracture of the left distal humerus just proximal to the elbow joint. The distal fragment was affixed to the side of the large proximal fragment which had placed the articulation 90 degrees off its normal direction (Figure 1). The attachment of the distal fracture fragment to the proximal fragment was mostly cartilage and there was no firm bony union. Thus, the fracture had healed in non-alignment and resulted in a permanent inability to fly.

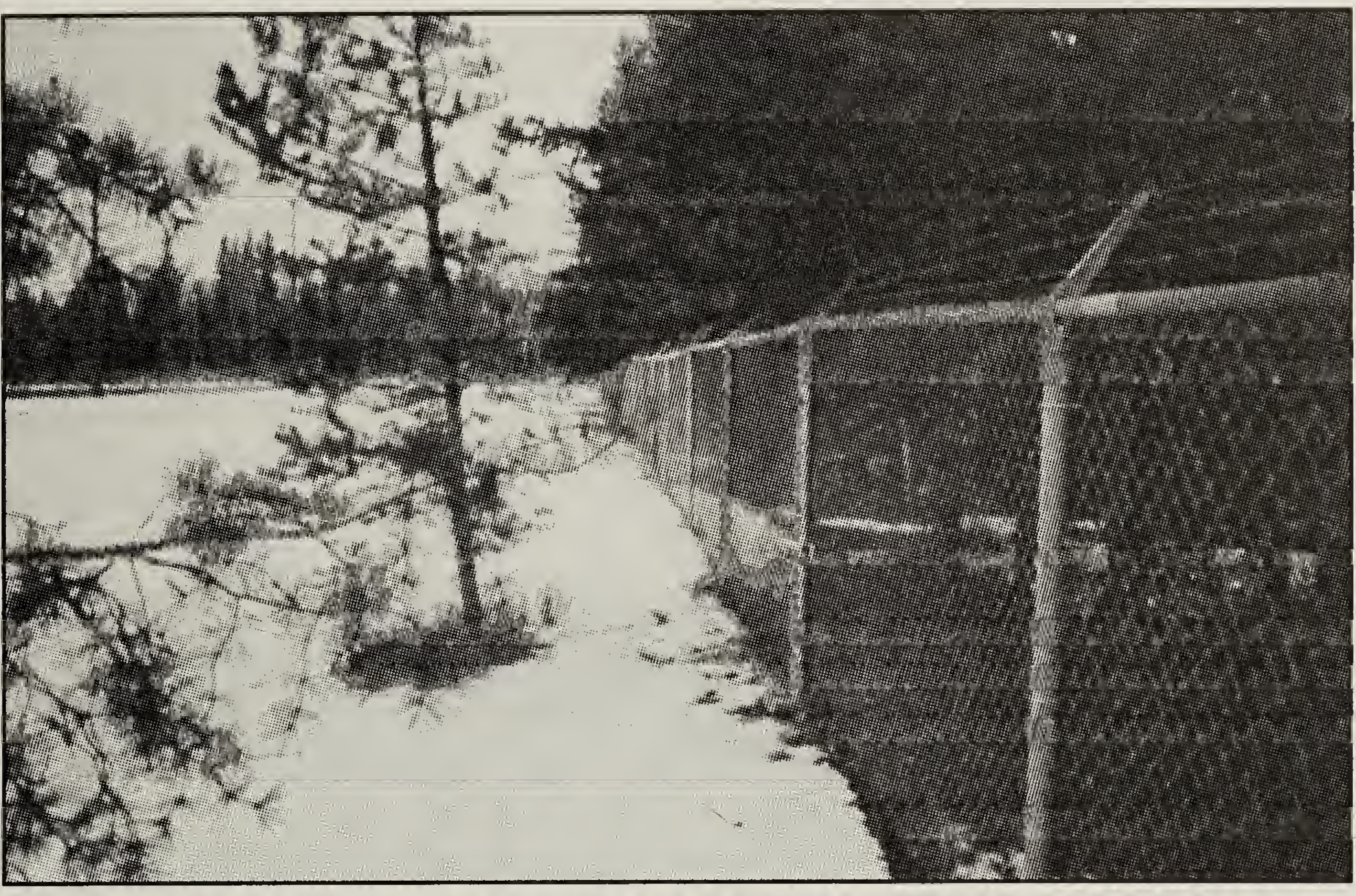
How this owl survived for 3 months without being able to fly is a mystery. Was she catching mice on foot? Or was her mate, who stayed with her, feeding her during late evening, night, or early morning, as male Great Horned Owls must do each spring during incubation of eggs and small young?

- *Donald Sutherland*, Box 935, Eston, SK S0L 1A0

RUFFED GROUSE ENCOUNTERS CHAIN LINK FENCE

On December 9, 2001, I observed a Ruffed Grouse attempting to cross a chain link fence at a residence compound near Lac La Biche, Alberta. As the bird was in no imminent danger and because there has been discussion and recent interest about wildlife corridors as well as movement barriers for wildlife species, I decided to observe its attempts to cross this structure. For the entire period of observation I was hidden in a building. The following is a brief description of what I observed.

At approximately 12:15 PM, I noticed the grouse emerging from a patch of forest and walking east towards a road that provided access into the compound. Its posture was upright, but as it approached the road it crouched and proceeded to run across. A 6-foot-high, mesh wire fence, located about 15 to 20 feet on the far side of the road



The fence which represented a barrier for a Ruffed Grouse that had walked across a relatively open area (on the left) to gain access to a treed area (on the right).
Joe Niederleitner

(Figure 1), stood across the direction of travel by the bird. There were no openings between the fence and the ground, which was covered by a few inches of snow. With the exception of a few trees, there was no forest cover along the side of the fence approached by the grouse.

Upon reaching the fence, the grouse walked back and forth, (north and south) for short distances in either direction along the fence, keeping close to the fence, (about 2 to 3 inches away). At first, it did not try to walk or fly through the fence (it tried this later). It pecked at the fence posts and subsequently fanned its tail. After several tries to walk around the fence by walking in either direction, it eventually began to walk more quickly and for longer distances along the fence. Interestingly, when it followed the fence line, it did not walk towards a larger road, which provided access to the compound; instead it walked longer distances in the opposite direction. Eventually it reached a gate that had been folded back against the fence. The opened gate could have provided easy access to the area the bird was attempting to travel into, however, rather than walking around the gate and through the fence, the bird walked into the wedge created by the folded back gate. Then the bird reversed direction and spent more time, some distance back from the gate opening, again walking back and forth on the same side of the fence.

After about 1.5 hours, ravens and a magpie landed in nearby trees. One of the ravens flew down and began to approach the grouse. The grouse then flushed and tried to fly through the fence; it did not flush away from the fence, which one might have expected. When it landed again, the grouse fanned its tail and walked away from the approaching raven, and then finally flew over the fence into the forested area it had so diligently tried to reach.

I have observed other Ruffed Grouse (as well as other birds) flying over the compound, unobstructed by the fence. Since the grouse observation described above, I have seen Ruffed Grouse perched, feeding in trees within the compound (then later flying out of the compound) as well as White-tailed Deer entering or leaving through an open gate. For a bird that chose to walk across the compound, however, the chain link appeared to be a significant barrier. Although one can speculate about why this bird was unable to resolve its predicament more effectively (was it a young or inexperienced bird?), it did spend about 1.5 hours during a 9-hour daylight period trying to reach its goal on foot when it could have been feeding.

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* * *

Ruffed Grouse drumming ***Robert A. Mitchell***

BLUEBIRD TRAILS OF THE SOUTHWEST NATURALISTS

The Southwest Naturalists maintain two bluebird trails. The first was set up in 1997 on property owned by Dave Zacharias, the NW 4-15-14 W3 and the SE 5-15-14 W3 about 8 km southwest of the city of Swift Current. The 18 boxes are on fence posts along a road that runs through farmland and passes through a coulee in natural prairie at the south end. A Caragana and Siberian Elm hedgerow extends approximately 0.8 km along the east side of the road and there are some buildings and a stackyard in the same quarter. The two quarter sections adjoining those that the road passes through are natural prairie with some Aspen, Choke Cherry, Saskatoons and Western Snowberry. One of these quarters also contains a well-treed farm site about 1/4 kilometre west of the road.

The second trail, established in 1998, travels through pastureland in the SE 21-16-14 W3 and SW 22-16-14 W3, 6 km north of Swift Current. Here 15 boxes are located along the fence lines on several well-treed acreages on the north side of the road.

October 24, 2001, the 33 boxes were inspected and cleaned out. Only two had not been occupied. Some nests were lined with Partridge feathers. Eight of the occupied boxes contained the following identified dead birds or egg remains: House Sparrow in two boxes, (one box had four broken sparrow eggs in addition to the adult bird); two unhatched eggs with brown speckles (probably House Sparrow); a mature Tree Swallow; a young Tree Swallow; five young Tree Swallows; one swallow egg; and two swallow eggs. The ninth nest contained an unidentified bird. The mortalities could be attributed to a very warm, dry summer. More ventilation in the boxes is needed.

- *James Beattie*, 147 5th Avenue S.E., Swift Current, SK S9H 3M8 and *Jacqueline Bolton*, Box 1266, Swift Current, SK S9H 3X4.

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Mountain Bluebird nest hole, Rockglen ***Chris Adam***

BIRD OBSERVATIONS FROM KYLE, SK

One day in May, I noted a male Spotted Towhee in hot pursuit of another male towhee east of my farmyard at my Big Dam. The pursued towhee took refuge under a goose nest, a square stack of railway ties 5 feet high, and topped with boards and flax straw. The pursuer landed on top of the nest platform, and while travelling around the edges expecting the pursued towhee to reappear, would every little way raise one wing directly overhead and vibrate it violently.

On June 6, I was packing a newly seeded field when I noted one of the packers was not tracking right. We had a very strong west wind and when I pulled the packers to the leeward side of the yard to correct the situation, I noted a small flock of birds fly into the nearby shelterbelt. One of these birds was a male Indigo Bunting, definitely not a bluebird. I saw an Indigo Bunting in my yard previously and at close range on June 22, 1953 as reported by Frank Roy in Birds of the Elbow.

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LAZULI BUNTING AT REGINA

On June 9, 2002 at about 8:45 AM, Ken Walton and Lynn Sayers found an adult male Lazuli Bunting singing just south of the Royal Saskatchewan Museum in the shrubbery near Wascana Lake north walkway and Albert Street. We were using 8x50 Leitz and 8x30 Bushnell binoculars. Ken Walton has seen this bunting many times in Colorado, where he lived for years, and knew the song right away. The Lazuli Bunting is rarely seen in the Regina area.[1]

- *Kenneth Walton* and *Mary Lynn Sayers*,
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L8L 7S9

1. BELCHER, M. 1980. Birds of Regina. Saskatchewan Natural History Society, Regina.

AN OBSERVATION OF COYOTES KILLING A WEASEL

In the evening of 27 May 2002, while I was quietly watching shorebirds on the west side of Beaverhills Lake, Alberta, a Coyote emerged from the reeds and walked across the mudflats, which were about 300 m wide. Ignoring the many sandpipers that thronged the shallows, the Coyote lapped up some water. Presently, among the reeds about 150 m away, I discovered a second Coyote. It appeared to be chasing something in between the dry stands of bulrush. Evidently, the prey escaped into a dense clump of about 1.5 m in diameter. The Coyote excitedly ran around it and thrust its snout into the reeds. After a minute or two, the Coyote went out of sight.

Turning my attention back to the lake shore, I was just in time to see the first Coyote run back, leaving a trail of black prints on the mud. It was chasing a weasel. Quickly overtaken, the weasel dodged erratically, turning and twisting back and forth. Its fate was sealed very soon after the arrival of the second Coyote. One of them grabbed the weasel and gave it a violent shake. Judging by its size, I think the victim was a Short-tailed Weasel. Both Coyotes, one of them carrying the limp prey, disappeared into the reeds. Whether or not the weasel was actually eaten or simply cached, perhaps because of its unpleasant smell, remained hidden from view.

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UNUSUALLY LARGE PLAINS GARTER SNAKE

Forty years ago I reported finding a Plains Garter Snake (*Thamnophis radix*) near McLean, SK that was 1092 mm in total length. At that time, the previous known record, which was collected by Francis R. Cook near Souris, MB in summer 1960 was 1029 mm. [1]

On June 3, 2000, alerted by my dog's strangely cautious but persistent examination of something in the weedy verge of a dirt road, I discovered an apparently freshly-shed skin of an even larger snake lying on the ground in a lifelike sinuous position. This was about 9 km west and 4 km north of Elm Creek, about an hour's drive west of Winnipeg. Identification of the skin, which was in remarkably good condition, as that of a Plains Garter Snake was confirmed on June 12 by William B. Preston, who thought it was a male. We measured the skin, care being taken to not pull it out of normal shape. Thus, a conservative snout-vent length of 934 mm and a total length of 1162 mm were obtained. The largest specimen measured by Bill previously in Manitoba "...was 746 mm (29.4 inches) in snout-vent length."[2]

1. NERO, R. W. 1960. Large Plains Garter Snake Found. *Blue Jay* 18:184

2. PRESTON, W. B. 1982. The Amphibians and Reptiles of Manitoba. Manitoba Museum of Man and Nature, Winnipeg.

- *Robert W. Nero*, 546 Coventry Road,
Winnipeg, MB R3R 1B6

EUROPEAN SKIPPER AT THE PAS, MANITOBA

The small brown European Skipper first appeared in The Pas on the Grace Lake Road July 18, 1998 in a moist, sedgy ditch bordering a sphagnum bog with Black Spruce and Tamarack trees. On July 20, 2000, four specimens were collected and are in the writer's collection. These also were taken on the Grace Lake Road. This road terminates about 2 miles east of The Pas at Grace Lake and a small airport. I have collected along this road for some 50 years now so it was a great surprise to net a new butterfly species and one from Europe at that.

It also proved something of a surprise in July 2001 to fail to collect it at The Pas. However, a number was seen in 2002 and on August 25, I saw a European Skipper at my farm on the other side of Grace Lake, 10 miles east of the first collection on Grace Lake Road.

On Grace Lake Road in 1998, the species was flying with the following butterflies which were collected and preserved : Common Ringlet, Greenish Blue, Eyed Brown, Silver-bordered Fritillary, Dun Skipper, Atlantis Fritillary, Dorcas Copper and Least Skipper. They are for the most part moisture loving species. The ditch in which the European Skipper and included species were collected, contains several species of sedge (*Carex* species) and cotton grass (*Eriophorum* species).

It should also be mentioned in passing that the Common Wood Nymph appeared here a few years ago, also along the Grace Lake Road. It appeared earlier by a few years and did not occur with the European Skipper when it was taken.

Several more recent records are known for European Skipper in southern Manitoba and two in Saskatchewan. It will be a very interesting study to watch its spread northwards in Manitoba - which it may well do as the roadsides of our provincial highways have sometimes been sown with Timothy (*Phleum pratense*) which is the preferred food plant.

- *Walter Krivda,* P.O. Box 864, The Pas,
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REDISCOVERING THE GREAT PLAINS: JOURNEYS BY DOG, CANOE, & HORSE

Norman Henderson, 2001. The John Hopkins University Press, Baltimore, Maryland. xv + 214 pp., 11 b/w illustrations. 2 maps. ISBN 0-8018-6688-X (alk. paper). CAN $45.00 (US $29.95). Available from the Nature Saskatchewan Bookshop.

Here we are more than a couple of centuries into this era of discovery and exploration, yet we can still enjoy well-written dispatches from a scientist afield. When the genre was new, publishers and booksellers did a brisk trade in volumes recounting the adventures of ethnographers, ornithologists, botanists, geologists, and explorers of every other kind who had freshly returned from expeditions in the New World, notes, drawings, specimens, and journals in hand. Reading this literature today in the early 21st century is a pleasure dampened only by our awareness of all that disappeared from the Americas during the intervening century. *Rediscovering the Great Plains: Journeys by Dog, Canoe, and Horse* is a book that takes us back to that classic genre with its rich landscape and cultural associations, but on the return trip our guide allows us to bring along our modern sensibilities, the cold comforts of our irony and regret in the face of all we have despoiled on the Northern Great Plains.

You will have to search far and wide to find a prairie guide with more knowledge, humour and humility than Norman Henderson. The education of a geographer and environmental scientist, and the temperament of a self-effacing naturalist-explorer make a blend in Henderson that wins your confidence from page one. I settled in for the trip expecting to enjoy every turn and side-track, and was never disappointed. The book, as Henderson avows in the opening line of his preface, is "about horses, dogs, canoes, and above all, about the Great Plains both old and new."

Using the Qu'Appelle Valley as his wandering transect, Henderson travels today's plains the old way. He heads down valley three times—once by dog and travois, once by canoe, and once by horse and travois—travelling in the company of "a remarkable husky," a "philosophical horse," and the phantoms of a dozen other grassland travellers, naturalists, and explorers. Buffalo-bird-woman, a Hidatsa woman who lived by the Missouri River in the early Twentieth Century is there for the travois construction, Alexander Henry accompanies Henderson on his first fording of the Qu'Appelle, and Henry Youle Hind's voice enters the narrative when Henderson's pack-dog balks in the trail.

The parallels and transitions between the author's experiences and those he relates from research come across seamlessly here because Henderson allows himself few illusions and is pointedly aware of all that separates his modern wanderings from earlier ones. The historical material deepens the narrative as we hear voices of and stories about Charles Darwin, Anthony Hendry, Konrad Lorenz, Tom Sukanen, Ghenghis Khan, Daniel Harmon and others.

Henderson's chapter headings, in a respectful nod to a style used in the accounts of Victorian wanderers, summarize the contents of each narrative parcel: "'Gee Up!'—Of a Final Journey in the Great Valley and of Adventures with a Philosophical Horse." The writing style throughout is direct, vigorous, and rich with metaphors and proper nouns. The book is a pleasure to read because, like the best writers of the personal essay, Henderson knows who he is (he admits he is "a white man marinated in Western science and thought") and doesn't shy away from an opportunity to make a joke at his own expense. He deftly interweaves wry moments with the dog, the horse, the canoe, and a skunk in a fridge with his scholarly reflections on other grassland cultures. The narrative contains vivid and at times bloodcurdling tales of the Scythians and Mongols of the Eurasian steppes, and of the Querandi of the South American Pampas—people who, like the Plains Indians of North America, came into their character and strength amid grass, wind, and open sky.

But there are also sharply observed moments from the author's own travels: encounters with local people, reflections on the Qu'Appelle landscape, and notes on animals seen at trailside or across the gunwales. This book resonates with the best of modern landscape literature when Henderson allows his own experiences to deepen and enliven the ecological and historical knowledge he imparts. In one of my favourite passages, for example, the trembling aspen tree comes in for comments that range from the sensory to the botanical and from the cultural to the personal:

"Humble aspen! It is the commonest and also the most audible tree on the Plains. Wisely the aspen sets its little rounded leaves at the end of long flattened stalks so they can swing freely in the lightest of breezes. This design limits the chance of being blown down in a prairie gale and is an arboreal parallel to the willingness of the prairie grasses to acquiesce to the sovereignty of the Plains wind. Aspen leaves murmur on, wistful and plaintive, when other trees fall silent, making this poplar as easy to identify by ear as by eye. Long ago in Europe the Romans were drawn by the whispering leaves to hold public meetings under black-scarred white boughs. At times I too have listened long to the leaves."

This is a fine book made even finer by its beautiful maps and by the ink drawings of Robert Cook. Cook works in a classic style that suits a narrative so reminiscent of nineteenth century explorer literature. Although he is a British draughtsman and draws with that delight in the details of shadow and landscape that one associates with English pastoral illustration, his kinetic figure drawings and use of horizon call to mind the antic farm people dwarfed by big land and skies in the paintings of prairie artist, William Kurelek.

The drawings are delightful discoveries in their own right, but they corroborate the story-telling, natural history, historical reflection and cultural commentary that make *Rediscovering the Great Plains* a lively journey to a land familiar yet surprising at every bend in the trail.

Reviewed by Trevor Herriot, 1952 Argyle Street, Regina, SK S4T 3S5

IN MEMORIAM

WILLIAM ANTONY SWITHIN SARJEANT, 1935-2002

LOIS A. WOODING, 506-10th St. E. Saskatoon, SK S7N 0E2

It is possible that the complex, interactive linkages of the natural environment pose an inherent attraction for the Renaissance mind, a mind that is capable of ranging beyond the conventional to explore the issues that bind us together as human beings; a mind that can bridge the divide that sometimes occurs between science and the humanities, between technology and nature, and between gown and town, and one that does not lose sight of the fact that we are a product of that natural environment no matter how much our modern lifestyle appears to distance us from it. It may be true of Nature Societies everywhere, but certainly Natural History groups in Saskatchewan attract a high complement of such people. My familiarity lies with the Saskatoon chapter, and recently the death of a society member caused me to pause and think about past and present high-achievers who walk, or have walked, among us as friends and mentors. For as well as we think we know them, it may not be until that time of final reckoning that we come to realize just how wide-ranging their interests were, and how great their contribution was. Certainly that was the circumstance I found myself in as I tried to condense the life of Bill Sarjeant to the confines of a memorial article.

Bill Sarjeant was born July 15th, 1935, to humble beginnings in the industrial city of Sheffield, England. At a time when the lives of millions were about to be plunged into the horror of another world war, it is unlikely that anyone would have predicted the success he would achieve. He became a distinguished academic geologist, a naturalist, an advocate for heritage preservation and the environment, and an authority on traditional folk music, as well as a performer. He was a respected author, publishing extensively in academic and non-academic fields, an inveterate collector of incredible diversity, and a noted bibliophile with a personal library that exceeded 85,000 volumes.

Bill's geology career owed its origins to the childhood discovery of beautifully preserved fossils unearthed during excavations for an air-raid shelter in the backyard of his home. After attending a local grammar school and being advised to abandon thoughts of a career in science, he entered the University of Sheffield where he persisted in studying geology. He graduated with a B.Sc. Honours degree in 1956, followed by a Ph.D. in 1959, and in 1972 the University of Nottingham awarded him a D.Sc. for distinguished scientific research.

Bill grew to love teaching. A brief period as a high school teacher led to a posting as Assistant Lecturer at the University of Keele, followed by a similar position at the

University of Nottingham before being appointed a full-time lecturer. He spent a year as Visiting Professor at the University of Oklahoma, and then a chance meeting with a Canadian colleague resulted in an invitation to join the geology faculty at the University of Saskatchewan in 1972. Bill's major research emphasis was connected with fossil microplankton and the history of geology but branched also into the investigation of other trace fossils, marine paleontology, topographical minerology and dinosaur extinction. He was also a leader in the study of vertebrate footprints, and his expertise proved invaluable when dinosaur tracks were discovered in the Peace River Canyon just prior to the area being flooded by a hydro project. Bill's work gained distinction among the international geology and paleontology community, and he was a member of the Jurassic Sub-Commission of the International Union of Geological Sciences. He published over 350 articles on geological topics, co-authored a book on fossil footprints, *The Tracks of Triassic Vertebrates: Fossil Evidence From North-West England*, and, over a period of several years, compiled a ten-volume bibliography, *Geologists and the History of Geology*, which in 1990 garnered him the prestigious Sue Tyler Friedman Medal from the Geological Society of London, England. In 1991, he won the Founders Medal awarded by the London Society for the History of Natural History, and in 1995 he was elected a Fellow of the Royal Society of Canada.

Bill's passion for geology was paralleled by an abiding interest in all forms of plant and animal life, particularly butterflies, which he delighted in photographing. Over the years he assembled and catalogued an impressive set of butterfly slides photographed in Canada and the 45 countries he visited while participating in conferences and conducting research. Each new country meant a search for new field guides. His library may contain as many as 150 guides to the planet's flora and fauna, and a considerable portion of his extensive stamp collection was dedicated to philatelic commemorations related to worldwide flora and fauna.

In 1958, while still a graduate student in England, Bill joined the Sorby Natural History Society and convinced the members to begin recording and publishing nature articles. He contributed to, and edited, the first edition of *Sorby Record*, which continues to flourish in much the same manner as *Blue Jay*, to which Bill was also a contributor. On arrival in Saskatoon, Bill became a member of both the Saskatoon and the Saskatchewan nature societies. He rarely missed a meeting and served as president of the Saskatoon Natural History Society in 1979 and 1980, acted as 2nd Vice President with Nature Saskatchewan from 1998 until 2000 before transferring to the board of SaskCulture in order to represent the concerns of conservationists. He was deeply touched when made a Fellow of Nature Saskatchewan in September 2001.

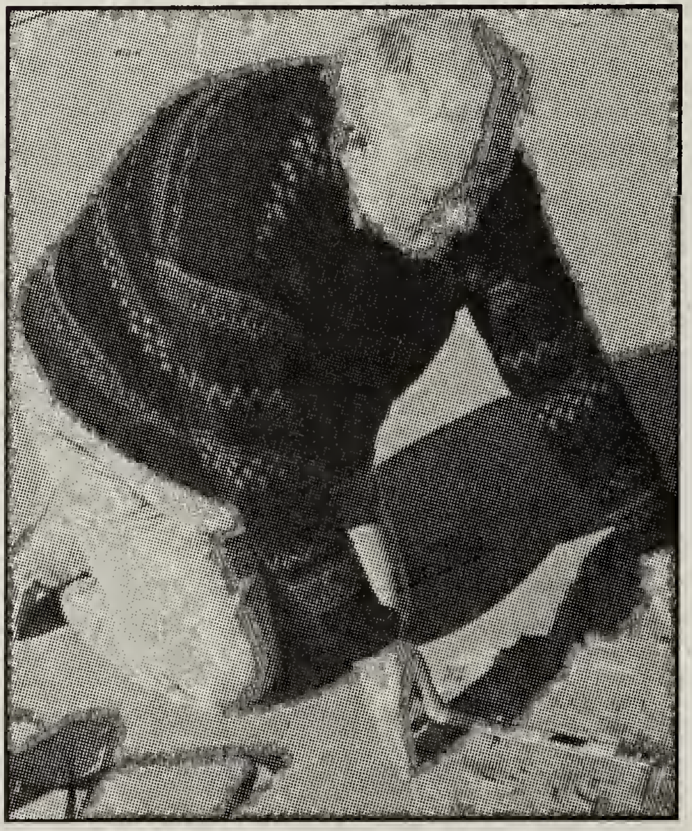
Starting in1973, Bill expended a great deal of time and energy lobbying for the idea of salvaging and recycling historic buildings, a concept now adopted by most urban centres. For five years he chaired the Saskatoon City Council's Special Committee for the Identification and Listing of Historic Buildings in Saskatoon. He was a member of the Saskatchewan Heritage Advisory Board and the Saskatchewan Archives Board, and became a major force behind the drafting of the Saskatchewan Heritage Property Act. He also chaired the Saskatchewan History Advisory Board and for the past thirteen years, edited the Saskatchewan History Review. Between 1973 and 1982 he co-authored three publications: *Saskatoon's Historic Buildings and Sites, Saskatoon: The Growth of a City*, and *Saskatoon: A Century in Pictures*. This last book became the official souvenir of Century Saskatoon for which he received a medal and scroll from the city, to add to a Saskatoon City Council Public Service Award, and a provincial award for his contributions to heritage preservation.

An acknowledged Sherlockian scholar, Bill co-authored a book that attracted Canadian and international interest, *Ms. Holmes of Baker Street,* an audacious, tongue-in-cheek thesis suggesting that Sherlock Holmes was in fact a woman. He became a co-founder of The Casebook of Saskatoon, a group that studies Holmesian fiction in particular, but has gradually expanded its investigations to include detective fiction of all kinds. Bill's vast collection of detective fiction novels contains many valuable first editions, and he lectured and published widely on many aspects of the detective fiction genre.

In 1972, along with two other Geology Department faculty members, he formed the Traditional Folk Trio, the nucleus for what was to become The Prairie Higglers, a folk group that has performed in Saskatoon for the past twenty-two years. Bill performed on and co-produced a double tape cassette and two CD's recorded by the group. Between 1977-1982, drawing on his formidable collection of records, tapes and books, Bill produced and broadcast a series of radio shows on CJUS-FM that involved 112 hours of air time devoted to folk music and folk musicians. He was also Vice President, then President, of the Canadian Folk Music Society, and from 1989 until his death remained the Archivist for the Canadian Society for Traditional Music.

Bill's academic and non-academic endeavours had a way of intersecting though a commonality with nature, perhaps the best example being Bill's nine-volume fantasy, science-fiction series entitled *The Perilous Quest for Lyonesse* published under the pen-name of Antony Swithin. The idea for this mythical country, which he called Rockall after a rocky outcrop in the North Atlantic Ocean, began in childhood and grew in tandem with his ever-expanding knowledge of the life-forms that called the earth home. By the time he began to write about Rockall, Bill had compiled detailed geological and topographical maps, invented a unique flora and fauna, written a complete language, completed an ethnography, designed stamps and musical instruments, and constructed a socio-political structure through which be began to explore ideas on politics and the environment. Sadly the "quest" was never completed, but the first four volumes were well received. In 2000, Bill was delighted to learn that place names taken from his books, as well as his own name Swithin, had been used to name geological seabed features surrounding the real island of Rockall, and as if this was not enough, he then discovered that these formations were adjacent to features named from the works of one of his literary heros, J.R.R. Tolkien.

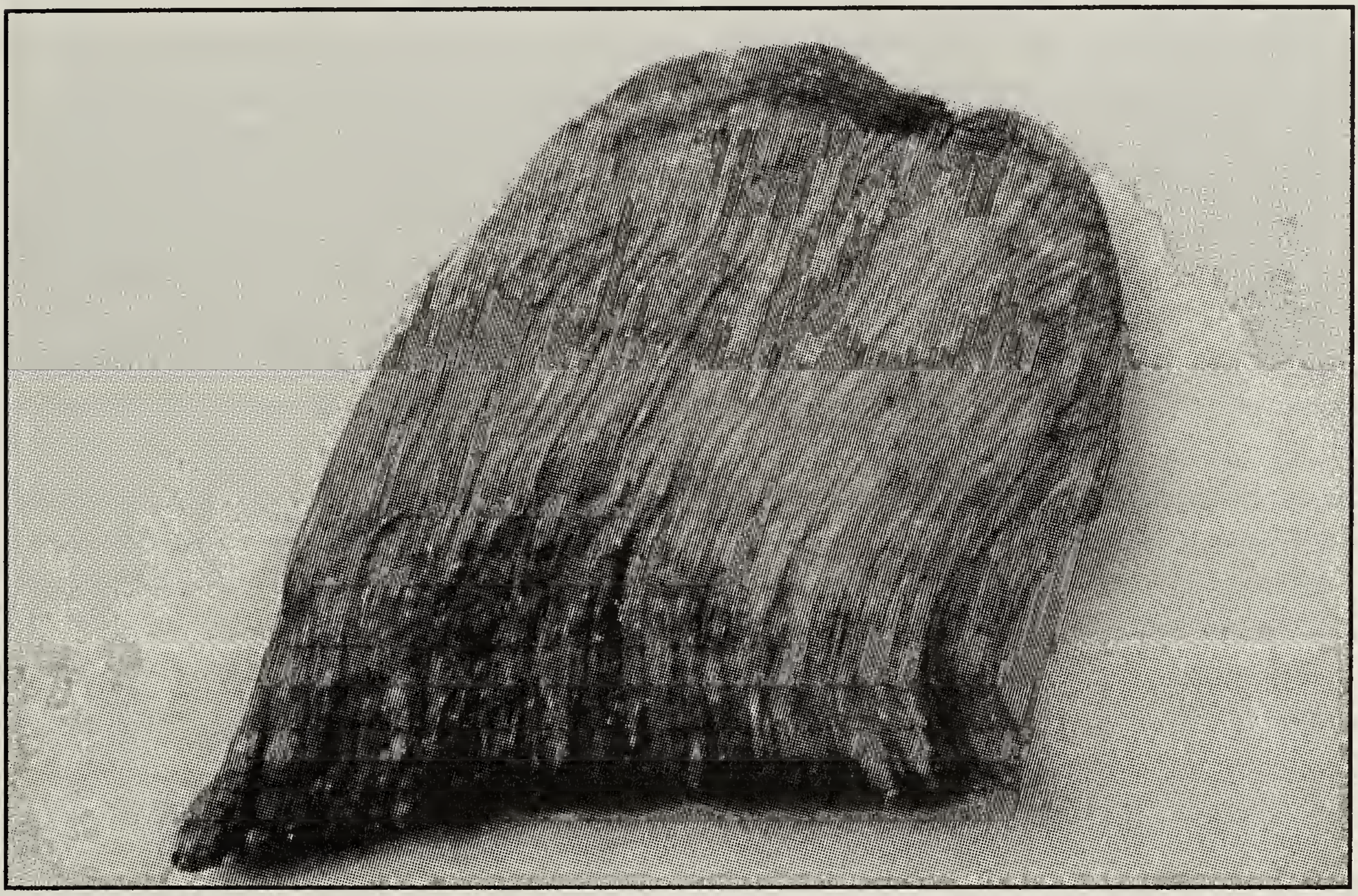
Bill never watched television and never brought work home from the office. He was a dedicated family man deeply grateful to his loving wife Peggy, who was his greatest support, and he delighted in the exploits of his three daughters, and more recently, his two grandsons. The term "Renaissance Man" has appeared frequently in memorials and I can find no better appellation. His principles, scholarship, humour and philosophy were inspiring, and the memory of Bill's sheer zest for life will continue to sustain and motivate those who knew him.



Bill Sarjeant measuring Permian reptile prints in Argentian in 1993.

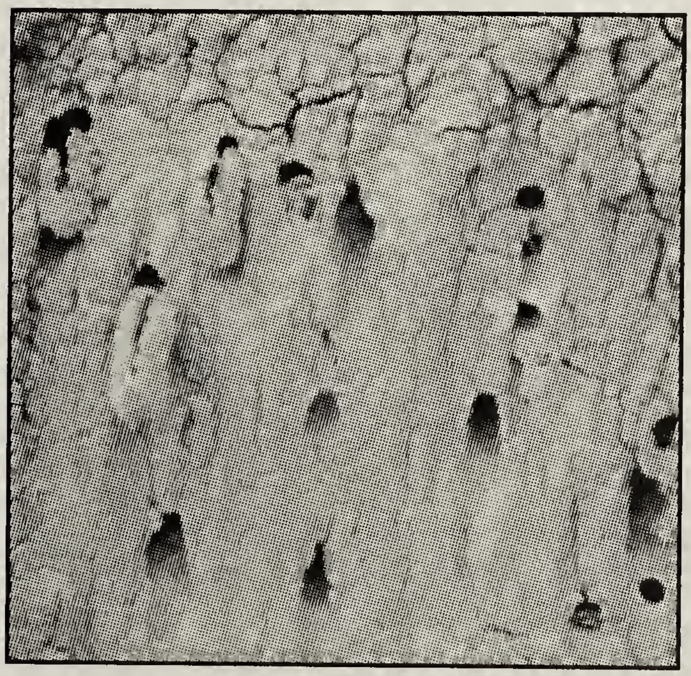
MYSTERY PHOTO

SEPTEMBER 2002 MYSTERY PHOTO



This object is one of several such objects found on the ground at Doré Lake, SK in late summer. It measures 8 cm from front to back and is 6.5 cm high. What is it?

ANSWER to the JUNE 2002 MYSTERY PHOTO



The holes, some with pendant tubes, in a claybank were made by a digger bee (*Anthophora occidentalis* Cress.) found in the prairie provinces, British Columbia, Montana, South Dakota, Oregon, Wyoming, Kansas, Colorado, Utah, New Mexico, Arizona. *Anthophora* is a large genus of fast-flying bees found on all continents except Australia.

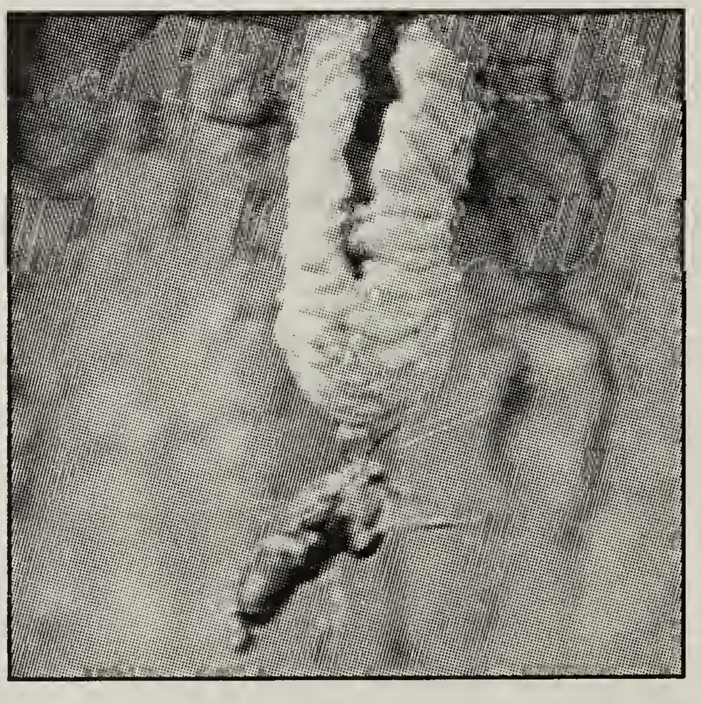
Nest site selection is one of the most important factors limiting the distribution and populations of native bee species. *A. occidentalis* females exhibit a distinct preference for vertical, hard-packed clay banks and because of this they tend to nest in aggregations. A sparse covering of vegetation or refuse is a common feature of selected nest sites. Availability of water is also important because females transport water to soften the hard dry surface for tunnel and brood cell excavation, and for construction of the down-turned turret. The tunnel is unbranched and usually a few cm long, ending in a cluster of up to 10 brood cells. Each brood cell is about 1 cm across and contains pollen and nectar that females collect from mid-July to the end of August from a number of flower sources including Wavy-leaved Thistle (*Cirsium undulatum*), nodding thistle (*Carduus* sp.), Pink Cleome (*Cleome serrulata*), and Hedge Bindweed (*Convolvulus sepium*). A single egg is laid in each cell and the bee larva feeds on the food provisions until it emerges from the cell.

Because females nest in aggregations, they tend to be subjected to pressure from a number of parasites, predators and opportunists. The blister beetle, *Hornia minutipennis minutipennis* (Coleoptera: Meloidae), the most important of the pillagers and parasites found in a nesting site in southern Alberta[1], has larvae that swarm over the face of the bank, and in and out of tunnels, trying to contact an adult bee that will carry it into a cell where it completes its larval stage. Two bee species, *Melecta californica* and *Triepeolus* sp. known to be parasites of other bees, were found with *Anthophora* cells in southern Alberta[1]. Adults of the chalid wasp, *Monodontomerus montivagus*, were commonly seen moving in and out of tunnels parasitizing intact cells. A bombyliid fly and a chrysidid wasp were also observed as associated with *Anthophora* cells. Another bee, *Osmia texana* and a vespid wasp *Ancistrocerus catskill* frequently utilize abandoned cells of *A. occidentalis* as nesting sites for their own brood and are considered opportunists. The distinctive turret may have evolved to protect the brood from parasites and predators, or as a nest orientation mechanism.

1. Hobbs, G.A., W. O. Nummi, J. F. Virostek. 1961. *Anthophora occidentalis* Cress. (Hymenoptera: Apidae) and its associates at a nesting site in southern Alberta. Canadian Entomologist 93:142-148.

- *Ken Richards,* Agriculture and Agri-Food Canada, 107 Science Place, Saskatoon, SK S7N 0X2

The editors would like to thank Ken Richards for reseaching and preparing the answer for the June mystery photo, and Paul Geraghty for taking the photograph and making it available to *Blue Jay.*



Moving bee and clay turret.

Paul Geraghty

ERRATA

The photograph of a Roundleaf Monkey-flower on page 83 of the June 2002 issue was taken by Elizabeth Reimer, not Eric Reimer as credited.

In order to read the article "The butterfly fauna of Beaverhill Lake" in the sequence submitted by the author, start with page 93, then jump to 100, then go back to 94 and on to 103. Because the page sequence of the published article is so difficult to follow, we will send a copy of the article in the correct sequence to anyone who would like one. Please contact the editors at the address given at the top of the inside front cover of every issue. Please note our email address, as of June 2002, is <leighton@sasktel.net>.

- *Anna & Ted Leighton*

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